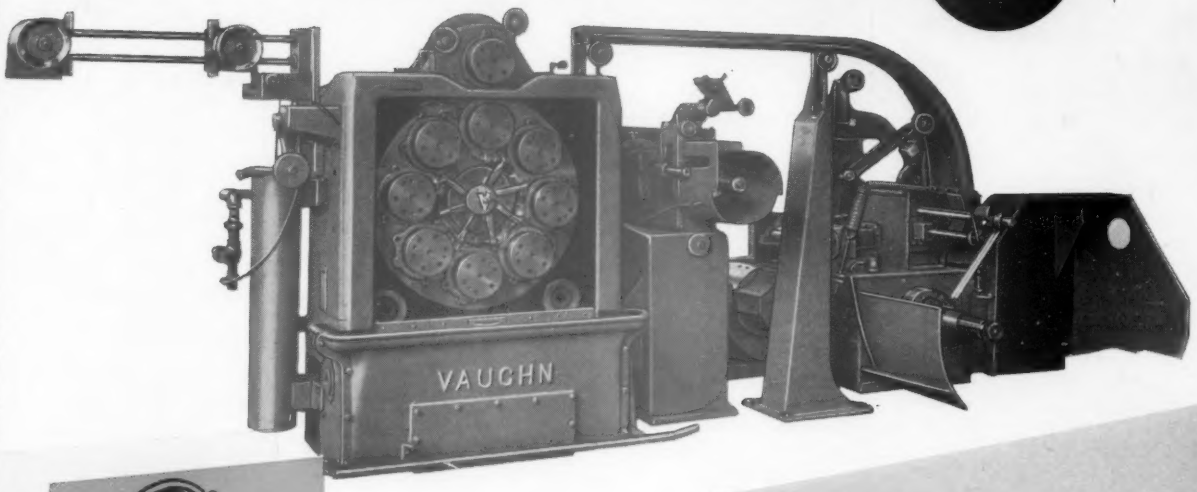
MARCH 1958

WIRE AND WIRE PRODUCTS

For your **HEAVY INTERMEDIATE** Wire Sizes

the Tandem-Spooler **Vaughn® RINGBLOX® CIX**



"Quick on the Draw!"

Combining speed with practical versatility in production, the 9-die Vaughn CIX Ringblox features an integrally-mounted, hydraulically-controlled spooler for 10" diameter spools, plus a floor-mounted motor-driven spooler for spools up to 30" diameter. Write us for data on the many Vaughn Ringblox types and sizes available to meet your requirements.

The VAUGHN MACHINERY CO.

CUYAHOGA FALLS, OHIO, U.S.A.

COMPLETE COLD DRAWING EQUIPMENT . . . Continuous or Single Hole . . . for the Largest Bars and Tubes . . . for the Smallest Wire . . . Ferrous, Non-Ferrous Materials or their Alloys.

OFFICIAL PUBLICATION OF THE WIRE ASSOCIATION

MODEL

D-PAK

COULTER & McKENZIE

FINE WIRE D-PAKERS

CONSTANT CONTROLLED TENSION

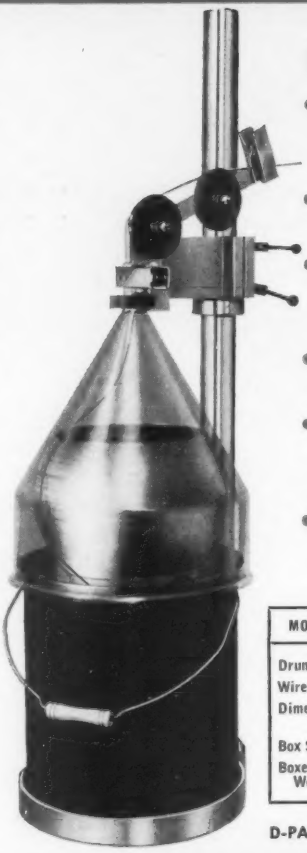
ATTACHMENT TYPE

D-PAK 100
Illustrated

- Meets all conventional industry D-Paking requirements
- 360° floor plane setting
- 180° vertical lead-in guide adjustment
- Snaps on both fibre and steel
- Shipped complete with dampening ring

MODEL	D-PAK 40	D-PAK 100
Drum Size	8"	11"-11¼"
Wire Sizes	AWG 27 and finer	AWG 17-30
Dimensions	9" Dia. X 14½" high	11½" Dia. X 16"
Box Size	10" X 10" X 18" high	12" X 14" X 20"
Boxed Weight	5 Lbs.	6 Lbs.

FLOOR TYPE



- Designed for D-Paking of wires at higher speeds with closer control
- Base may be permanently fixed
- Vertical height and horizontal plane settings may be fixed
- Adjustable for various wire sizes
- Swing top arm for ease of drum change and positive reset
- Dual capstans give greater range of tension adjustment

MODEL	D-PAK 40-A	D-PAK 100-A
Drum Size	8"	11-11¼"
Wire Size	AWG 27 and finer	AWG 17-30
Dimensions	9" X 12" X 34" high	12½" X 17" X 43" high
Box Size	10" X 13" X 35"	13" X 18" X 44"
Boxed Weight	20 Lbs.	33 Lbs.

D-PAK 100-A, *Illustrated*

ACCESSORIES

TENSION CLIP

- Spring Loaded
- Reversible Wiper Felts

SIZE	CLIP
Dimensions	1" X 3"
Net Weight	¼ Lbs.

CORE BALL

- For Use with Floor Type D-Pak

SIZE	BALL 40	BALL 100
Core Diameter	6"	8"
Net Weight	1½ Lbs.	2 Lbs.

FRICTION CAPSTAN

- Adjustable Tension
- Precise Control

SIZE	CAPSTAN #1	CAPSTAN #2	CAPSTAN #3
Dimension	4⅜"	3-7/16"	2¼"
Wire Size	10-23 AWG	17-30	24-37
Net Weight	3 Lbs.	1 Lb.	½ Lb.

DAMPENING RING

- For Use with Attachment Type D-Pak

SIZE	RING 40	RING 100
Core Diameter	6"	8"
Net Weight	¾ Lbs.	1 Lb.

PATENTS PENDING

DELIVERIES FROM STOCK
F.O.B. BRIDGEPORT, CONNECTICUT

35 UNION AVENUE

TELEPHONE EDISON 5-1101
LIEBER'S CODE "MACKENZIE"

THE COULTER & McKENZIE MACHINE CO., INC.

BRIDGEPORT 7, CONNECTICUT, U. S. A.

INCORPORATED 1881

Look to Standard...

for

Service • Ingenuity • Integrity

plus

"America's Finest

Wire Drawing Lubricants"

We...

thoroughly appreciate the opportunities of assisting in solving difficult problems.

We are ready and will be happy to show you how—

Standard Industrial has pioneered in most of the outstanding contributions to better wire drawing through better lubricants. Consult Standard Industrial for the solution of your difficult problems.

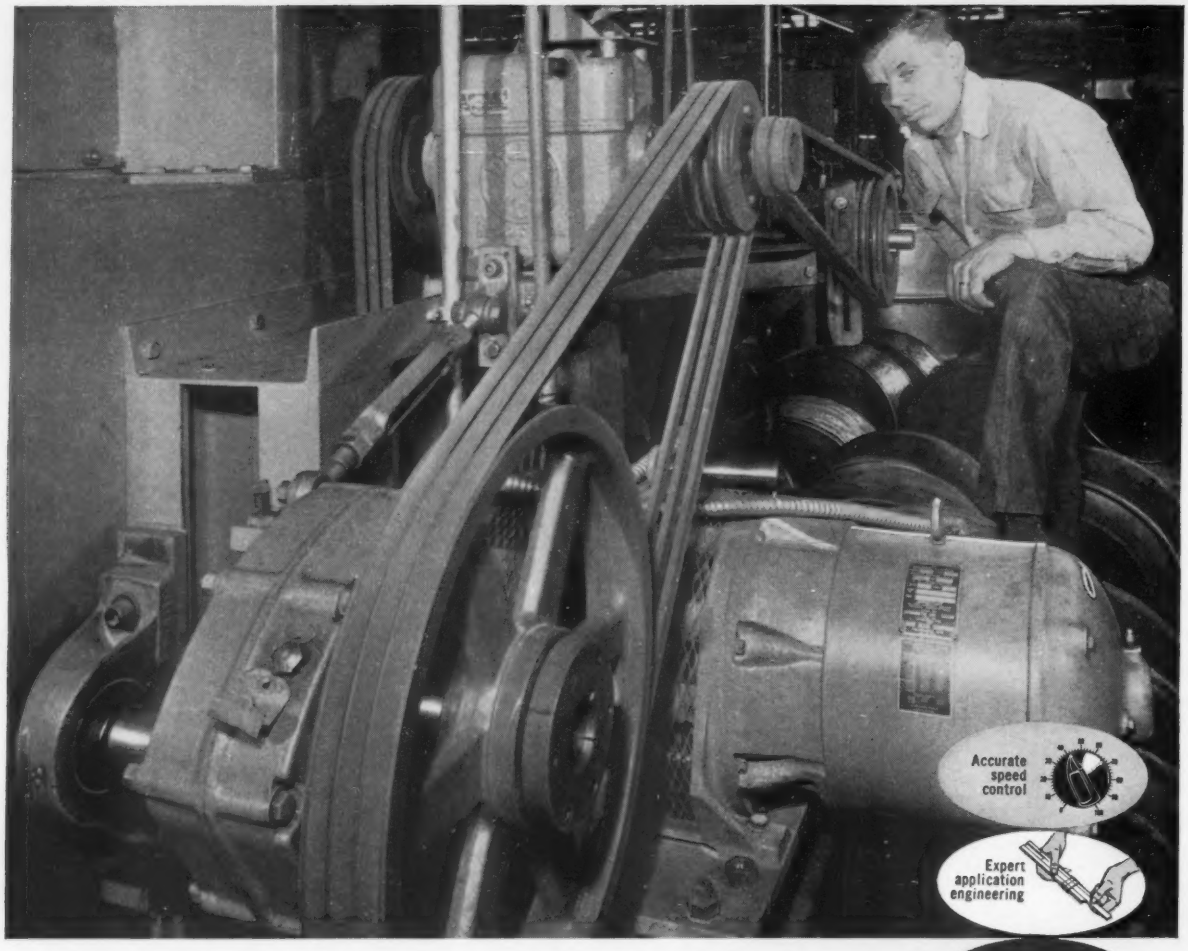
Standard Industrial

COMPOUNDS CO., INC.

FRANKFORT, ILLINOIS

(A suburban Chicago area city)

Telephones: 2131-2141



Louis Allis drives double production at Central Cable Company

Ajusto-Spede® drives improve extruding operation — cut costs 75% — slash rejects 90%

Central Cable Company, of Freeport, Illinois, is a major manufacturer of utility cable. In recent years they decided to improve their cable insulation by going to the extrusion process.

To power their extrusion lines, they found that of all the drives available, Louis Allis Ajusto-Spede® A. C. drives offered the greatest flexibility and precise speed control. Result: production increased 100% . . . manpower costs dropped from $240 to $60 per day . . . rejection rate because of improper insulation dropped from 10% to less than 1%.

Adjustable speeds from 0 to 1400 fpm permit coating of varying cable sizes without changing mechanical set-up. Precise "one-dial" master speed control assures positive speed relation between extruder, capstan, and takeups—permits uninterrupted processing — maintains proper wire tension from initial feed through windup on shipping spools.

In addition, Louis Allis drives are controlled by one potentiometer, eliminate need for ac-dc converter. Equally important, the Louis Allis drives at Central Cable Company have not had a single breakdown since their installation in 1948 — nor have they required replacement or repairs of any kind.

For modernizing — or a new installation — consult Louis Allis *first*. Contact your nearby Louis Allis District Office or write to The Louis Allis Company, 451 East Stewart Street, Milwaukee 1, Wisconsin.

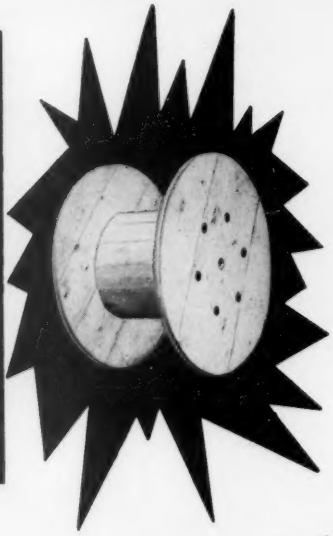
LOUIS ALLIS

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES

YES

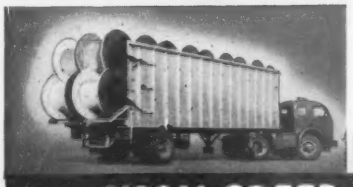
NON-RETURNABLE

WOOD REELS IN ALL SIZES
FOR ALL TYPES OF ELECTRIC
WIRE AND CABLE . . . . . .



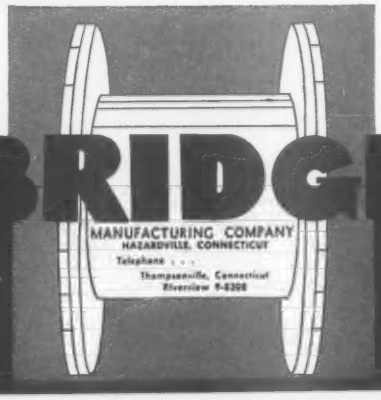
YOU SAVE WITH NON-RETURNABLES

- Reduced Reel Investment
- Less Storage Space
- Lower Freight Costs
- No Repair Costs
- No Return Freight Charges
- No Bookkeeping
- No Deposits Needed
- No More Headaches!!



HIGH SPEED
SHIPPING SERVICE IN OUR OWN TRUCKS

within a radius of 200 miles from the plant. Fast freight will bring you Bridge reels within a few days east of the Mississippi.



BRIDGE
MANUFACTURING COMPANY
HAZARDVILLE, CONNECTICUT
Telephone . . .
Thompsonville, Connecticut
Riverview 9-8308

NON-RETURNABLE REELS GIVE YOU A DEFINITE PACKAGING COST.

"REEL GOOD . . .

Let us quote on your reel needs. Send us your specifications. Better yet, visit our plant and see how and why Bridge reels are made so well at so low a cost.

WOOD REELS"

draw it *FAST*

draw it COOL

Sweet music for economy-minded
wire production men—
Morgan-Connor's exclusive air cooling
gives you fast drawing
and high production.
You get superior results
at low die costs
and low power costs.

MORGAN WORCESTER

WM-104

MORGAN CONSTRUCTION COMPANY — WORCESTER, MASSACHUSETTS

WIRE AND WIRE PRODUCTS*

Reg. U. S. Pat. Off.

A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable.

DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 33 March, 1958 No. 3

Designated as Official Publication By The Wire Association

Contents

The Wire Outlook 275

Commodity Price Trends—Steel, Copper and Aluminum
by David Williams 277

Techniques for Insulating Wire and Cable with Silicone Rubber
by D. C. Youngs, D. J. Badamo and M. N. Culver 285

The Production of Wire Screening
by Jack C. Heilig 291

Transistorized Continuity Test Set
by J. C. Hauf and H. S. Hall 295

Mechanical Descaling and Drawing of Mild-Steel Rod
by L. Marsden 298

Dielectric Stress in Thin Walled Cable
by Sam Kalifon 303

Wire Association Meetings for 1958 304

Wire Association Regional Meeting in Buffalo 305

Wire Association Electric Wire and Cable Section 306

How to Save Money by Cold Heading Parts 307

Abstracts 308

Outstanding Personalities of the Wire Industry 316

A Review of Recent Wire Patents 324

Steel Statistics 326

Aluminum Statistics 327

Copper Statistics 328

Index to Advertisers 347

Where-to-Buy 348-352

WIRE and WIRE PRODUCTS is indexed regularly by
Engineering Index, Inc., New York, N. Y.
The H. W. Wilson Co., New York, N. Y.

RICHARD E. BROWN, President and Publisher

R. S. Spengel, Secy.-Treas. & Gen'l. Manager
J. Edward Donnellan, Vice-President

Edmund D. Sickels, Editor

— ASSOCIATE EDITORS —
Rommel, Allwine & Rommel, Consultants on Patent Information

Publication Office: Jersey City, N. J.
Executive Office: 453 Main St., Stamford, Conn.
* Reg. U. S. Pat. Off.

WIRE & WIRE PRODUCTS, Vol. 33, No. 3. March, 1958. Publication Office at One Sherman Avenue, Jersey City, N. J. Executive Office 453 Main Street, Stamford, Conn. Published monthly by the Quinn-Brown Publishing Corp., Richard E. Brown, President; R. S. Spengel, Sec'y and Treas. Subscription Price: U. S. $8.00; Canada, $8.00 per year; Domestic 75 cents per copy; Foreign 90 cents per copy, except October Convention Issue and January Proceedings Issue, $1.25 per copy; Foreign $10.50 per year. Entered as second class matter at the Post Office, Jersey City, N. J. under the act of March 3, 1879.

Copyright, 1958 Quinn-Brown Publishing Corp.

Scott Printing Company, Jersey City 7, New Jersey

REPUBLIC

FLANGED STEEL TRAVERSES

Available in 3 Finishes

★ PLAIN
★ PAINTED
★ HOT DIPPED GALVANIZED

Select from industry's most complete line of Flanged Steel Traverses. Plain and painted finishes meet most requirements. Smooth, galvanized finish available for coated wire and cable.

No special tools or know-how required for reel assembly. Traverse sizes made up to 56″ diameter and 48″ traverse. Mail coupon for complete facts.

REPUBLIC STEEL CORPORATION
DEPT. C-4078—R
3222 EAST 45th STREET • CLEVELAND 27, OHIO

Send more information on Flanged Steel Traverses.

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

With

NOPCO® KLY

a liquid fine wire drawing lubricant

Be sure to try Nopco KLY next time you're drawing fine size steel or fine and intermediate size copper wire. It's *different*—and everything different about it you'll find is a big advantage.

First, this emulsifiable oil mixes quickly and completely with water—hot or cold. This feature alone is enough to make it ace-high with you. But it has other advantages equally important.

Your bath lasts longer. Nopco KLY has a built-in affinity for water. Its lubricants stay *uniformly active* much longer, since the "drag out" of the lubricants from the solution is reduced beyond anything you've ever seen.

Prevents Formation of Insoluble Copper and Lime Soaps—both the copper soaps, which score dies, clog feed lines and screens; and the lime soaps you've been bothered with when drawing lime coated steel wire.

KLY may be used for high carbon, low carbon, limed, galvanized, and liquor finished fine steel wire—also for fine and intermediate copper, bronze, and brass wire. You'll surely want to try this die-saving, cost-saving lubricant soon. Write today for free booklet "Nopco KLY", which gives full instructions, lists percentages of fat in all emulsions.
Nopco Chemical Company,
Harrison, N. J.

YOU MIX IT FASTER, EASIER

YOUR BATH LASTS LONGER

YOU GET UNIFORMLY ACTIVE LUBRICATION

1907–1957 50 Years OF PROGRESS IN CHEMISTRY

NOPCO

PLANTS: Harrison, N. J.
Cedartown, Ga. • Richmond, Calif.
London, Canada

DESIGNED TO MEET NEW DEMANDS UPON THE WIRE INDUSTRY...

VERSATILE MODEL "AD" MICROWELDERS
... FOR HARD-TO-WELD ALLOYS

MODEL "AD"
MICRO-WELD
AIR OPERATED
RESISTANCE TYPE
BUTT WELDER

In this modern age of rockets and atomic projects new demands are being made daily upon the wire industry. Close and continuous contact with the wire industry has resulted in a steady flow of improvements in MICRO-WELDERS to meet specific welding requirements.

Equipped with foot operated air clamps, with adjustable air control, two stage air operated upset mechanism with high pressure finish for forge action, 12 step quick action heat tap switch, straight slide water-cooled headpieces.

AVAILABLE IN THREE MODELS

AD-3
1/4" to 1/2" diam. alum. and alum. alloy
1/4" to 3/8" diam. copper and copper alloy
1/4" to 3/8" diam. steel and steel alloy

AD-4
3/8" to 3/4" diam. alum. and alum. alloy
3/8" to 5/8" diam. copper and copper alloy
3/8" to 5/8" diam. steel and steel alloy

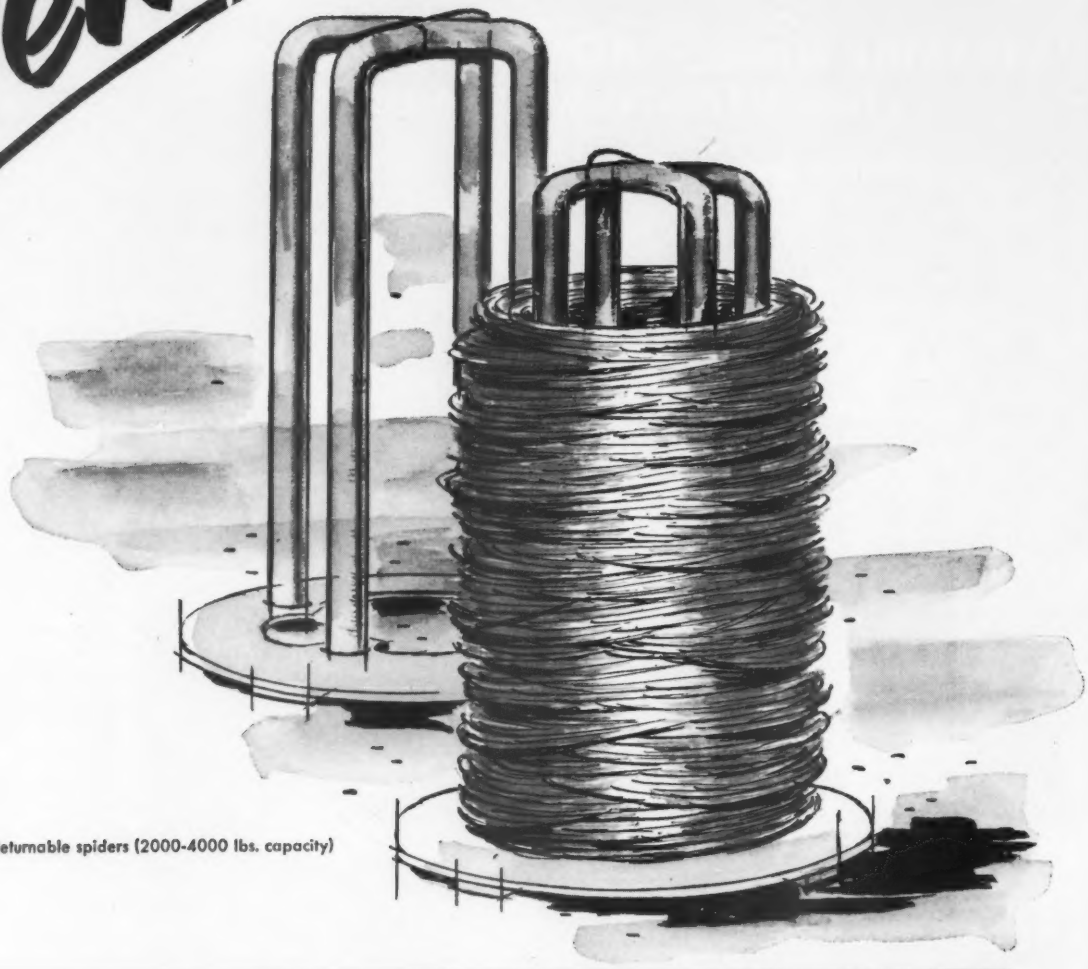
AD-5
1/2" to 3/4" diam. alum. and alum. alloy
1/2" to 3/4" diam. copper and copper alloy
1/2" to 3/4" diam. steel and steel alloy

MICROMETER PRECISION MICRO-WELD ®

MICRO PRODUCTS CO.

20 NO. WACKER DRIVE • CHICAGO 6, ILLINOIS • TELEPHONE STate 2-7468

New 3000-4000 lb.



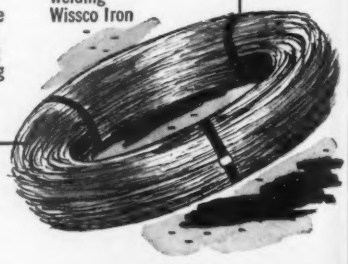
Returnable spiders (2000-4000 lbs. capacity)

Here is a partial list of the many types of carbon steel wire manufactured by CF&I:

Grades	Finishes
low carbon	bright dry drawn or lime bright
annealed flat and shaped	bright grease drawn
medium high carbon	cadmium coated
high carbon	coppered
flat and shaped	extra clean
oil tempered	smooth bright
spheroidized	galvanized
	liquor
	white liquor

Standard Types (partial list)

aircraft cord	fuse	merchant	square
bee	Gamma spring	nail	stapling
bobbin ring	garment hanger	oil tempered	staple
bobby pin	glass netting	picker tooth	stone
bookbinder	hair pin	picture cord	tie
broom	hat	pin ticket	twisted & laid
brush	hose, reinforcement	regulator	upholstery
casing	hose, mechanical	rope	valve spring
clip	hose, vacuum	safety pin	weaving
concrete reinforcing tie	lock spring	screen	welding
cotter pin	lockwasher	shaft, flexible	Wissco Iron
curtain spring	manufacturers' drawn	Signal Corps	
die spring	mattress	snake fishing	
fine & weaving		spiral binding	
		spring	



Steel strapped coils (200-2000 lbs.)

WHEN YOU NEED WIRE . . . MAKE

CONTINUOUS WIRE "SPIDER"

. . . cuts downtime as much as 15%

. . . reduces scrap loss

Here's what CF&I's new giant package did for one upholstery spring manufacturer who had been using 700-lb. wire coils:

- **Downtime was reduced**
- **Production was increased 15% per shift**
- **Men and materials handling equipment were freed for other work**
- **Scrap losses were reduced**

These returnable spiders will cut your production costs, too. If your manufacturing process is not equipped to use spiders, order our 200-2000 lb. continuous-length, steel-strapped wire coils. (Sizes #13 AWG and coarser apply for both spiders and coils.)

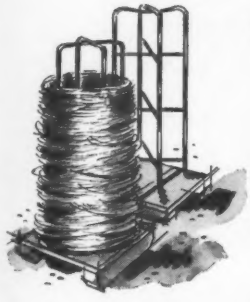
From spools to spiders . . . CF&I's newly modernized and enlarged plants are equipped to provide fast delivery on high or low carbon steel wire . . . round, flat or shaped . . . in a wide variety of sizes, tempers, grades and finishes . . . in small quantities or carload lots. Let us know your requirements.

CF&I-WICKWIRE WIRE

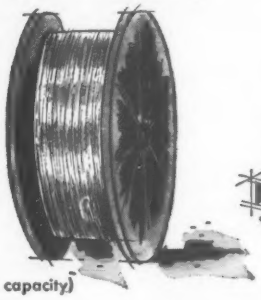
THE COLORADO FUEL AND IRON CORPORATION

THE COLORADO FUEL AND IRON CORPORATION—Albuquerque • Amarillo • Billings • Boise • Butte • Denver El Paso • Ft. Worth • Houston • Kansas City • Lincoln (Neb.) • Oklahoma City • Phoenix • Pueblo • Salt Lake City • Wichita
PACIFIC COAST DIVISION—Los Angeles • Oakland • Portland • San Francisco • San Leandro • Seattle • Spokane
WICKWIRE SPENCER STEEL DIVISION—Atlanta • Boston • Buffalo • Chicago • Detroit • New Orleans • New York Philadelphia • **CF&I OFFICES IN CANADA:** Montreal • Toronto • **CANADIAN REPRESENTATIVES AT:** Calgary Edmonton • Vancouver • Winnipeg

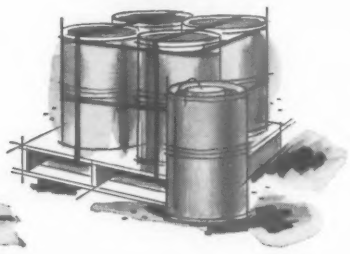
Other CF&I standard packaging methods



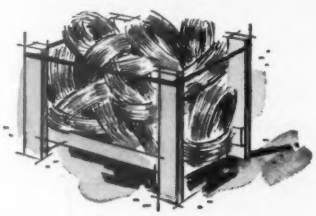
Non-returnable spiders (500-700 lbs. capacity)



Reels (500-800 lbs. capacity)



Pay-off paks



Steel strapped wooden rack

5758

CF&I YOUR SOURCE OF SUPPLY

U.S.I.

Vol. III No. 2

POLYETHYLENE PROCESSING TIPS

PREDICTING END PROPERTIES OF BLENDED RESINS

A polyethylene processor may attempt blending of resins either for economic reasons or to attain a specific set of properties.

He may be successful, but blending, in general, is not considered good practice because it is difficult to obtain a homogeneous blend and the end results are difficult to predict – especially if the resins are from different manufacturers.

However, if you find it necessary to blend, it is possible to predict certain end properties with reasonable accuracy.

Melt index and density are predictable

Assuming that your polyethylenes are closely enough related, it is possible to blend for specific melt indexes and densities and therefore to obtain the desired properties that are functions of either of these.

The chart and the formula given here will enable you to predict either melt index or density. If you are blending for melt index, the logarithmic average will give the correct figure. Simply follow the directions in the caption under Figure 1. If you are blending for density, the arithmetic average will be correct. Simply use the formula described in the example given with Figure 2.

Recommended Precautions

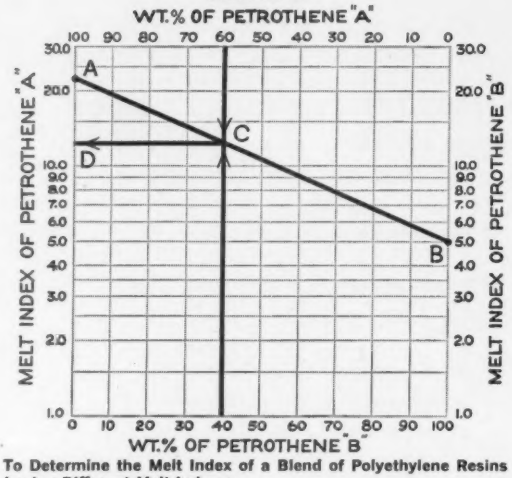
It is recommended that you limit yourself to injection molding when working with resin blends. If you are using a rotary drum for mixing, allow a tumble time of at least 20 minutes.

Shots should be relatively large, limited generally to about eight ounces in single cavity molds and twelve ounces in multiple cavity molds. Restrictive gatings, back pressure plates or similar devices, however, promote homogeneous mixing and sometimes smaller items can be effectively molded when these devices are used.

U.S.I. offers technical assistance

An answer to your individual need may well be found in obtaining directly from a manufacturer a polyethylene resin with the properties you want. And remember that U.S.I.'s Technical Service Engineers are always ready to work with you in finding the solutions to specific resin property problems.

FIGURE 1:



To Determine the Melt Index of a Blend of Polyethylene Resins having Different Melt Indexes –

1. Assume you are blending 90 pounds (60%) of U.S.I. PETROTHENE® 202 polyethylene resin with 60 pounds (40%) of PETROTHENE 201.
2. Petrothene 202 has a melt index of 22.0. On the left hand scale, therefore, fix a point at 22 (indicated by "A").
3. Petrothene 201 has a melt index of 5.0. On the right hand scale fix a point at 5 (indicated by "B").
4. Draw a line connecting 22 and 5.
5. Since you are using 40 percent of resin B(201), fix a point at 40 on the bottom and draw a vertical line.
6. From the point where these two lines intersect ("C"), draw a horizontal line so that it intersects the left hand scale ("D").
7. At "D" you now can read the melt index of your proposed blend.

This technique can be used to calculate the melt index of two polyethylene resins from the same manufacturer. If you do this type of blending frequently, you can set up these scales on any semilogarithmic graph paper. Your U.S.I. Technical Service Engineer will show you how.

FIGURE 2:

(% A) × Density of A + (% B) × Density of B = Density of blend

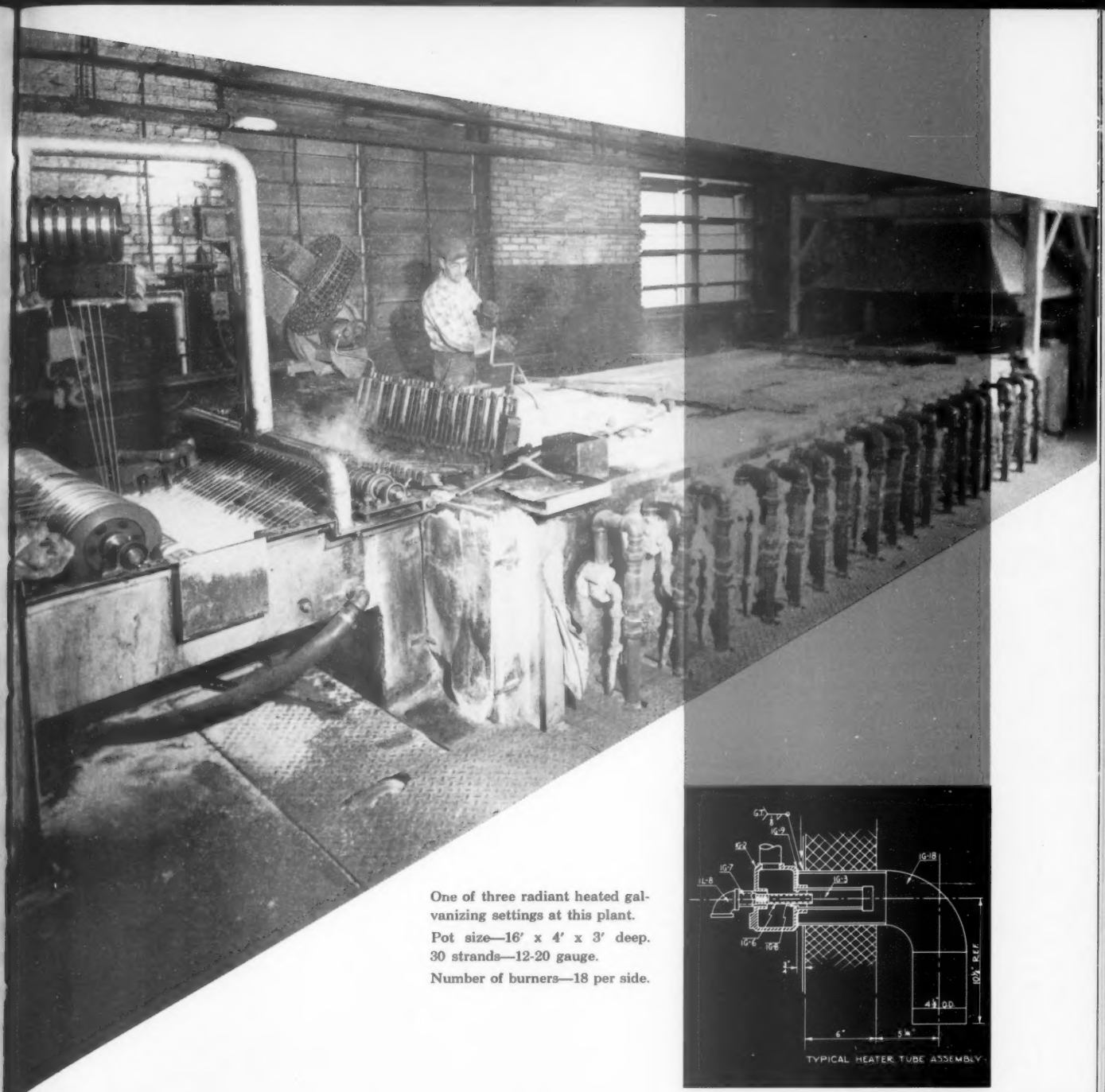
To Determine the Density of a Blend of Polyethylene Resins Having Different Densities –

1. Consider that you are mixing 105 pounds (70%) of U.S.I. PETROTHENE 206 (density 0.924) with 45 pounds (30%) of PETROTHENE 201 (density 0.916). Call resin 206 "A", and resin "201" "B".
2. Substituting these quantities and densities for the symbols in the formula above, you get the following numerical equation –

$0.70 \times 0.924 + 0.30 \times 0.916 = 0.9216$

3. The density of your blend therefore is 0.9216.

U.S.I. INDUSTRIAL CHEMICALS CO.
Division of National Distillers and Chemical Corp.
99 Park Ave., New York 16, N.Y.
Branches in principal cities



One of three radiant heated galvanizing settings at this plant.

Pot size—16′ x 4′ x 3′ deep.
30 strands—12-20 gauge.
Number of burners—18 per side.

LEE WILSON Wire Galvanizing Lines at Colorado Fuel and Iron's Pueblo Plant

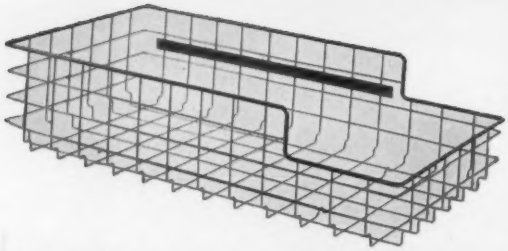
Here is the way to heat galvanizing pots with accurate control response, drossage cut in half, and pot life doubled. Combustion is completed in the alloy elbow so there is no flame impingement on pot walls, and with radiant transfer of heat, there are no overheated areas to cause boiling of dross. » Our specialist on galvanizing processes can help you improve this operation in your plant. Call on us for an immediate analysis and recommendations.

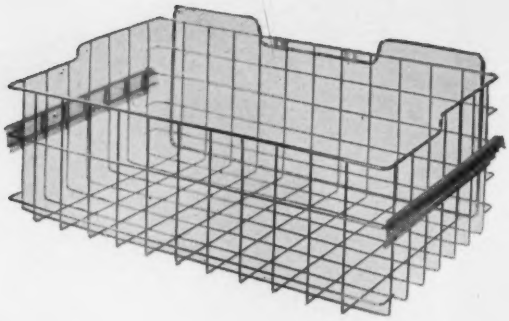
Lee Wilson* ENGINEERING COMPANY, INC.

20005 WEST LAKE ROAD • CLEVELAND 16, OHIO

HIGH CONVECTION ANNEALING FURNACES
MAKE THE BEST METALS BETTER

*ORIGINATORS AND LEADING PRODUCERS OF HIGH CONVECTION ANNEALING FURNACES





YOUNGSTOWN EXTRA SMOOTH CLEAN BRIGHT BASIC WIRE

Plus Automated Fabrication Techniques Gives High Quality Production to *Bauer* Brothers

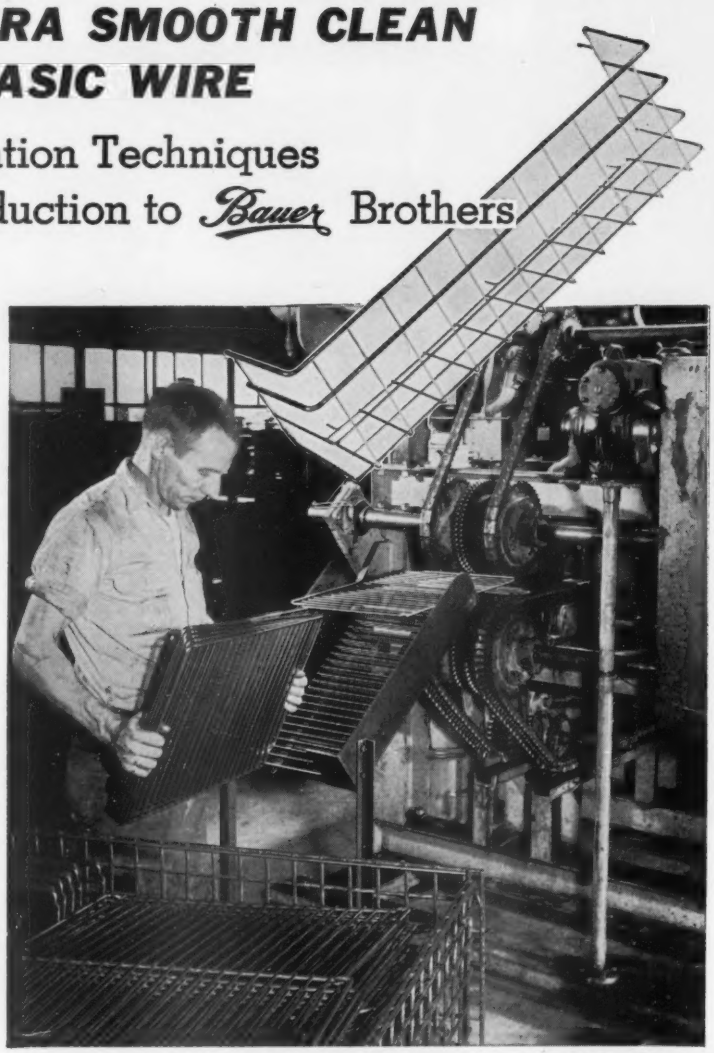
Over 75 years of production know-how combined with an excellent background of engineering experience enables the Bauer Brothers Co. of Springfield, Ohio, to provide their customers with economical, intelligent, up-to-the-minute wire product designs.

Using the latest techniques in "automation", this progressive fabricator relys on Youngstown's Extra Smooth Clean Bright Basic Industrial Quality Wire to keep both their production and product quality at a high level. They find it forms easily—while still providing the necessary rigidity and strength required in their finished products.

Its surface is free from all oil, dirt and grease which enables plating that's permanent—won't flake off. Also, it spot-welds fast and sure for permanent, strong construction. Why not make it your continuing specification for increased production and profits.

All Youngstown Wire is quality-controlled through each integrated operation from ore mining to final drawing. Thus, you can be sure there will be no injurious seams and piping, laps, die marks or internal tearing and cupping to hold up your production lines.

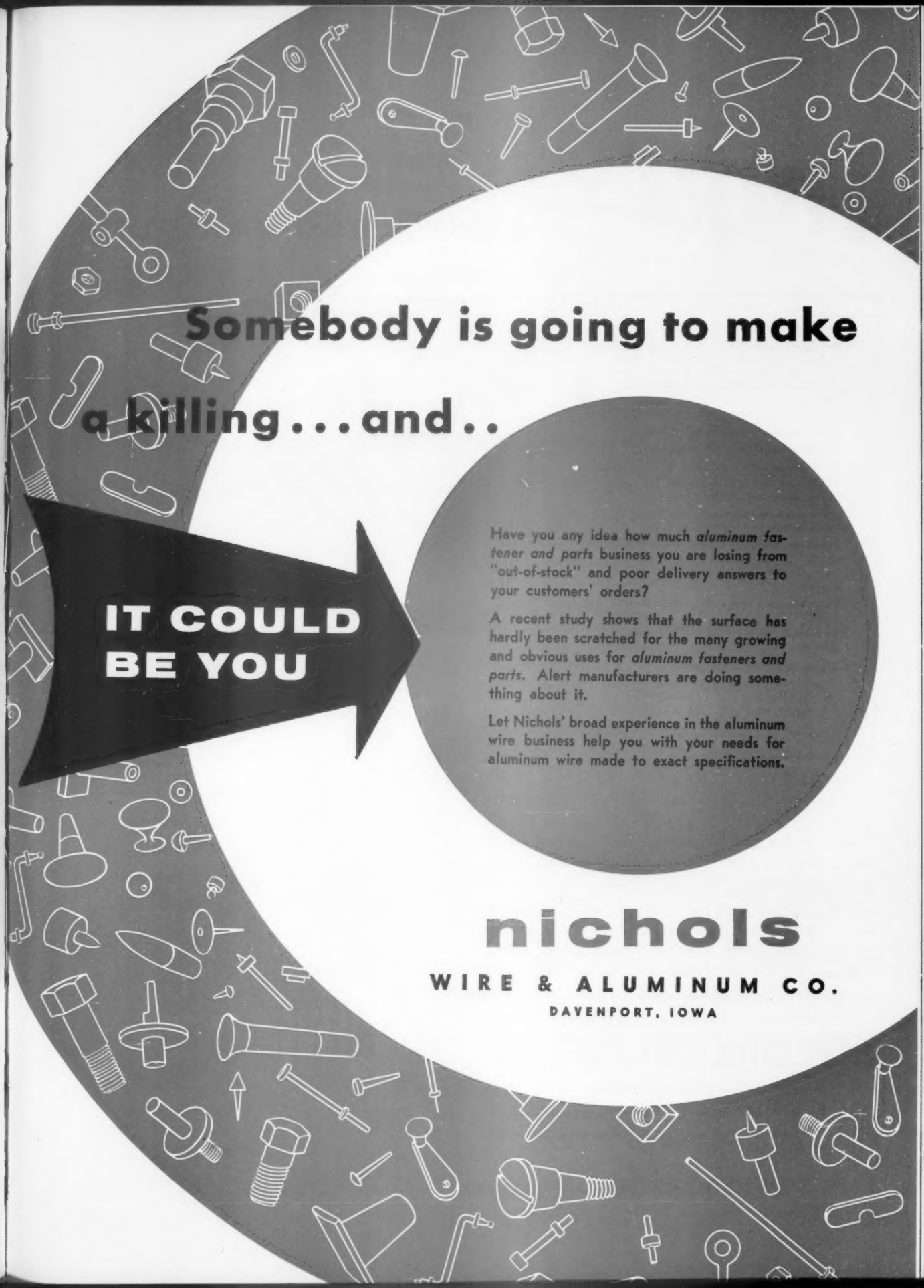
For additional information or metallurgical assistance, write or phone your nearest Youngstown District Sales Office today.



Bauer's "Flying Dutchman" using Youngstown Extra Smooth Clean Bright Basic Wire automatically fabricates a frame into a finished shelf in only 60 seconds.

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yoloy Steel
General Offices - Youngstown 1, Ohio
District Sales Offices in Principal Cities


Somebody is going to make
a killing . . . and . .
IT COULD
BE YOU
Have you any idea how much *aluminum fastener and parts* business you are losing from "out-of-stock" and poor delivery answers to your customers' orders?
A recent study shows that the surface has hardly been scratched for the many growing and obvious uses for *aluminum fasteners and parts*. Alert manufacturers are doing something about it.
Let Nichols' broad experience in the aluminum wire business help you with your needs for aluminum wire made to exact specifications.
nichols
WIRE & ALUMINUM CO.
DAVENPORT, IOWA

Improved

SHAFTLESS TAKE-UP

General Specifications

Both side frames move in or out simultaneously, keeping center of reel traverse always in line with delivery point of cable, thus equalizing and minimizing cable deflection.

Reel gear and drive pinion remain in engagement at all times.

Quick traverse reversing by air valve.

Motor driven screw width adjustment.

Motor driven screw reel lift.

Traverse adjustable for reel width and cable diameter, while machine is running.

Traverse speed adjustable over range of cable diameters in increments of 1/20.

Drive can be supplied to suit customer's requirements.

Mechanical slip clutch friction drive for the capstan.

Variable speed motor drive with manual control.

Variable speed motor drive with automatic electrical control.

Available in the following sizes:

36" dia. reel to 52" dia. max.
36" dia. reel to 72" dia. max.
36" dia. reel to 84" dia. max.
42" dia. reel to 96" dia. max.

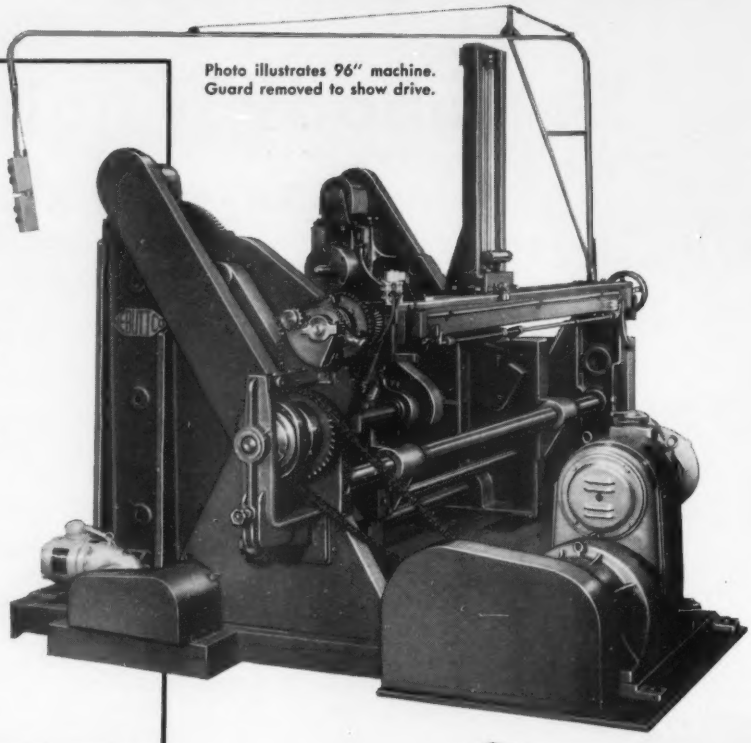
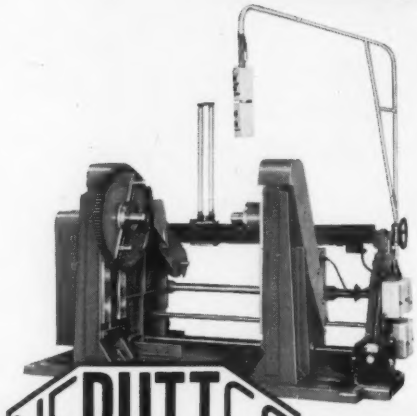


Photo illustrates 96" machine. Guard removed to show drive.

This heavy duty Take-Up includes latest developments which further increase ability to produce high quality cables. Many of these machines, in the previous model, are in continuous, trouble-free operation in plants throughout the country. It handles bare or insulated cables of all weights and sizes at a wide range of speeds . . . is readily controlled by the operator by means of the convenient swinging pendant push button station. Various drives can be provided and the machine readily adapted by our engineers to meet your special requirements. Write us for further information and details.



NEBUTTCO

Braiders **Bunchers**
Cablers **Stranders**
Take-ups **Taping Machines**

NEW ENGLAND BUTT CO.

DIVISION WANSKUCK COMPANY

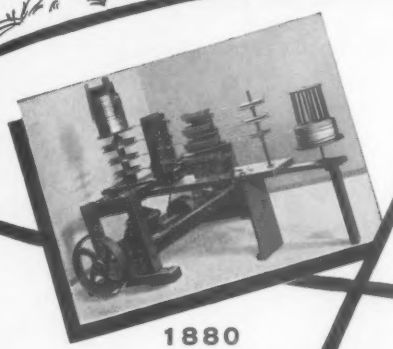
304 Pearl Street · Providence 7, R. I.

In England — James Day (Machinery) Ltd., 28 Maddox Street, London, W-1.

HERBORN

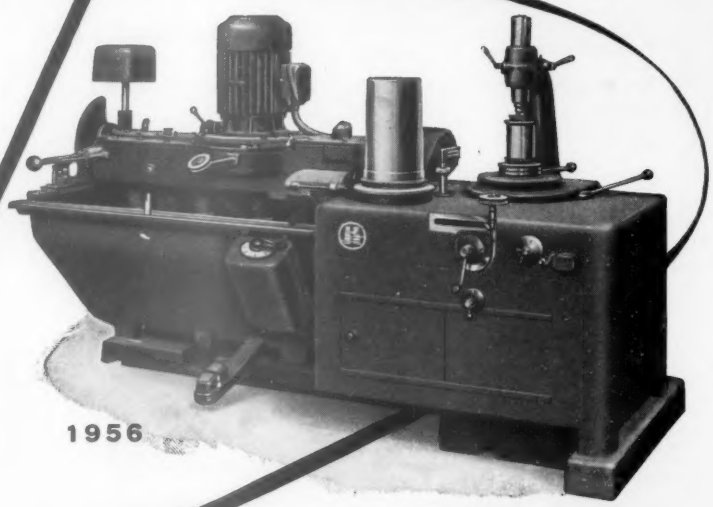
A Long Way

leads from the
first wet-drawing machine



1880

to the modern
High-Production
Multiple Wire
Drawing Machines
Operating under
the "HERBORN"
Submerged System



1956

The Invention and
Development of the "Submerged
System" Wire Drawing Machines
is inseparably connected with
the name "HERBORN."

Please send your inquiries to:

MASCHINENFABRIK HERBORN BERKENHOFF & DREBES A.-G. **HERBORN/DILLKREIS** GERMANY

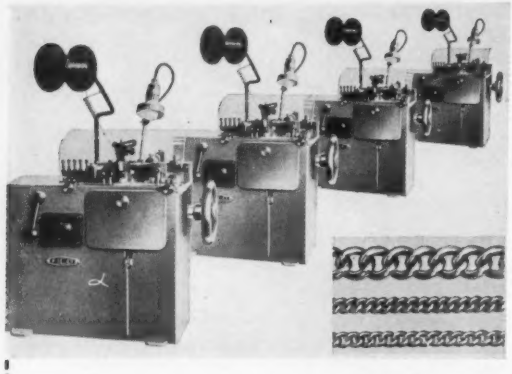
Sole Representative in the U.S.A.:

KURT ORBAN CO., Inc., 34 Exchange Place, JERSEY CITY 2, N. J.

FICO FISCHER & CO.

of Western Germany

World's Leader in Automatic Chain Making Machines



INVITES

your inquiries on the Fico Automatics—the finest in Automatic Machinery for Chains, Mesh, Findings and other wire products. Contact our New York office.

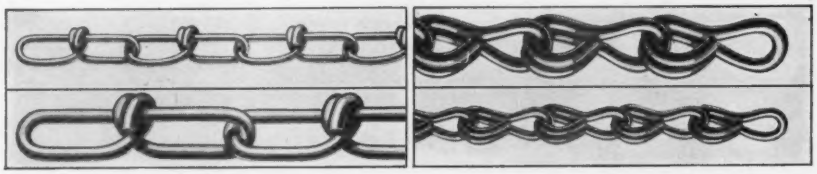
★

* FICO AUTOMATICS—
For the entire line of Chains, Mesh and Hollow Balls for Industry.

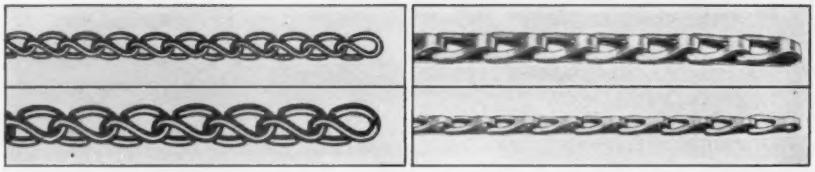
* FICO AUTOMATICS—
For Jewelry Chains and Findings and other wire products.

* FICO AUTOMATICS—
For Design, Workmanship and Performance—
Famous the World Over.

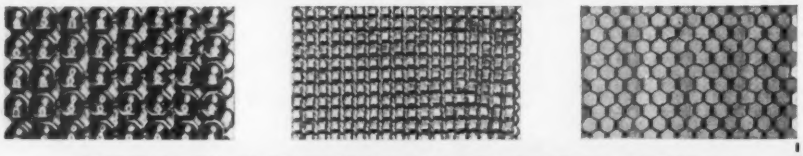
* FICO—Now Ready to Serve You Even Better through the New American Sales Agency.



DOUBLE LOOP CHAIN **SAFE OR REGISTER CHAIN**



DOUBLE JACK CHAIN **SASH CHAIN**

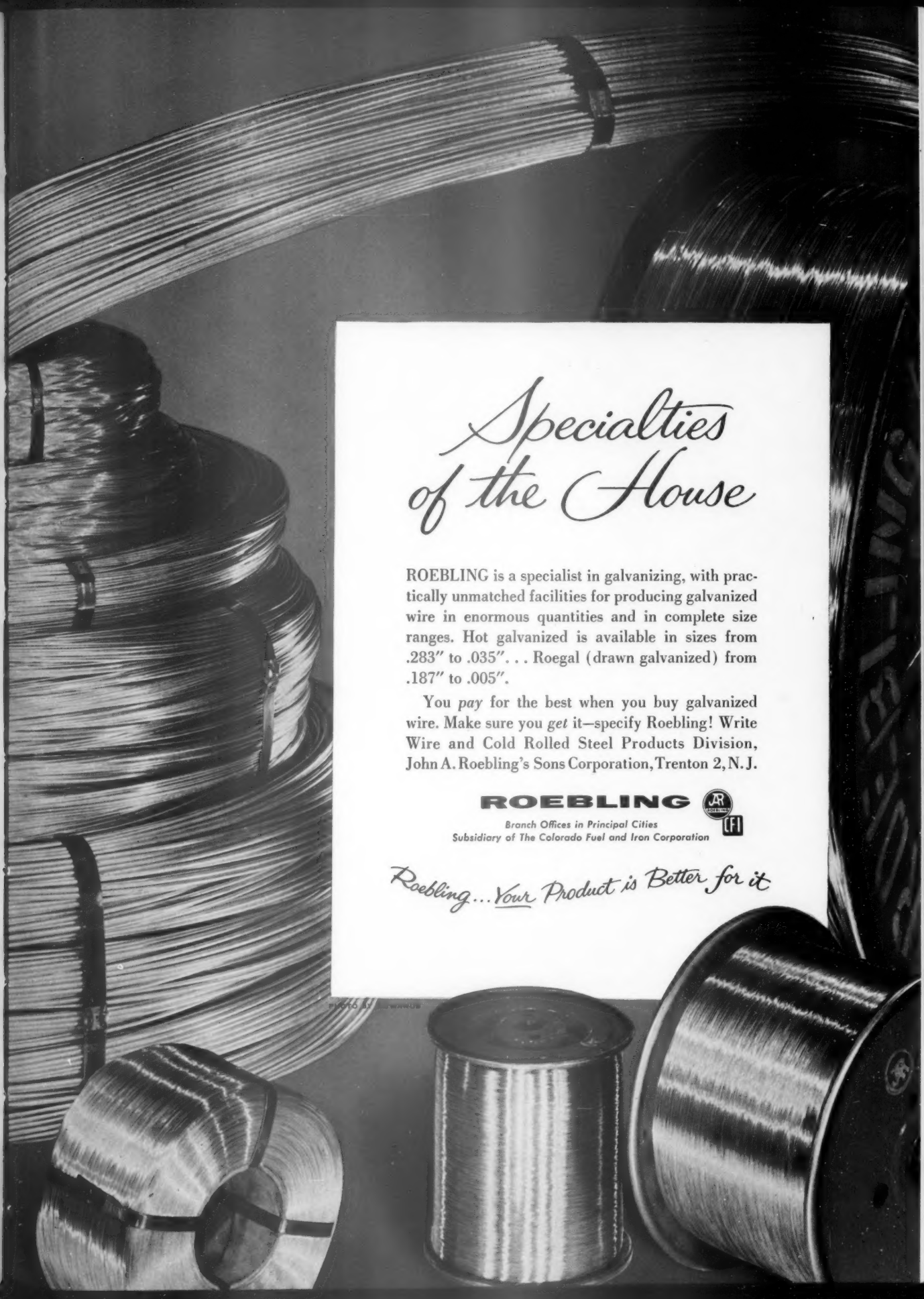


OTHER FULLY AUTOMATICALLY MANUFACTURED PRODUCTS

Sales Office for U.S.A. and Canada

PAN AMERICAN SUPPLY CO.

15 West 44th Street **OXford 7-6168** **New York 36, N. Y.**



Specialties of the House

ROEBLING is a specialist in galvanizing, with practically unmatched facilities for producing galvanized wire in enormous quantities and in complete size ranges. Hot galvanized is available in sizes from .283″ to .035″. . . Roegal (drawn galvanized) from .187″ to .005″.

You *pay* for the best when you buy galvanized wire. Make sure you *get* it—specify Roebling! Write Wire and Cold Rolled Steel Products Division, John A. Roebling's Sons Corporation, Trenton 2, N. J.

ROEBLING

Branch Offices in Principal Cities
Subsidiary of The Colorado Fuel and Iron Corporation

Roebling... Your Product is Better for it

HEAVY DUTY CATERPILLAR CAPSTAN

The D-S Caterpillar Capstan is specially designed to provide precisely controlled, heavy pulling power for large diameter cables. The increased gripping area and straight line pull of the caterpillar design prevents scuffing, fraying, and bending of heavy cables by the capstan.

- The D-S Caterpillar has a pull of up to 5000 lbs. on cable from extruder.
- Special tread grips *around* cable for maximum grip without insulation damage.
- 17 pairs of treads gripping constantly at up to 400 lbs. pressure, infinitely variable by air pressure control.
- Alternate tread materials available with resiliency, excellent friction, and abrasion resistance.
- Treads open and close on common cable centerline and are articulated to follow cable variations.
- Maximum cable speeds of 100 or 200 feet per minute. Other speeds available.
- An optional lead wire capstan allows wire rope to be attached to cable end to start cable through treads.
- Adjustable guides which center cable within the tread.

For further information write to:

D-S MYSTIC CONNECTICUT U.S.A.

DAVIS-STANDARD

Division of FRANKLIN RESEARCH CORPORATION

20 WATER STREET, MYSTIC, CONNECTICUT

IN EUROPE AND THE STERLING AREA, CONTACT FINNEY PRESSES LTD., BIRMINGHAM, ENGLAND.

discover a new difference
• in die life • in brightness

FLEXAL MCA

A New Complex Metallic Wire Drawing Compound by SWIFT & COMPANY

Flexal MCA is a specially formulated, high titer metallic stearate compound that is available only through Swift & Company. It is a homogeneous formulation that is very low in moisture—designed to help assure consistent performance, extended die life and maximum drawing mileage.

Flexal MCA "rolls" well in the die box to help minimize the possibility of channeling and help provide the means for more uniform color; smooth, uninterrupted draws at high speed and better commercially bright wire.

It's designed to work with long and smooth efficiency at speeds ranging from 900 to 2000 feet per minute, through multiple draws on most ferrous alloys. It will pay you to *check the specs* on FLEXAL MCA; then return the coupon for details—or a trial order for use on your own equipment. See for yourself . . .

One trial is better than a thousand claims

- Homogeneous formulation
- High titer, metallic stearate base
- Use directly in die box or cut—where required
- Very low moisture
- Use for most ferrous alloys
- Ask for details on FLEXAL "5"—for dry drawing or hot dip coating

To Serve Your Industry Better **Swift** 103RD YEAR

and FREDDIE FLEXAL invites your further inquiry

SWIFT & COMPANY, Industrial Soap Dept.
4115 Packers Ave., Chicago 9, Illinois

☐ How can we place a trial order for Flexal MCA for evaluation in our operations?

☐ Please send a FREE 10 lb. sample of Flexal MCA for our evaluation.

(Please describe intended usage briefly) .....

.....

Your Name & Position .....

JUST CLIP TO YOUR LETTERHEAD AND MAIL

PRICED FOR QUICK SALE

WIRE ROPE MANUFACTURING EQUIPMENT

STRANDERS

24-Bobbin Planetary Strander (24 wires plus core) built by Wire Machinery Corp. Recently rebuilt. 15 H.P., 1200 RPM, 220 volt AC motor. Price: $17,500.00 F.O.B., Brooklyn, N. Y.

12-Bobbin Bar Type Tubular Strander (12 wires plus core). Built by Dixie Wire Machinery Co. 12 years old, used 5 years. 2 HP 220 volt motor, 1750 R.P.M. Price: $950.00 F.O.B., Brooklyn, N. Y.

2 6-Bobbin Planetary Stranders (7 wire) built by Dixie Wire Machinery Co. 12 years old; used 5 years. Good condition. Complete accessories, no motors. Price: $450.00 each, F.O.B., New York, N. Y.

7-Bobbin Tubular Strander, 20" or 21" bobbins. Built by New England Wire Machinery Co. 25 H.P. motor, 220/440 volts, 1180 R.P.M. Good condition. Rebuilt in 1954. Price $11,000.00, F.O.B., Brooklyn, N. Y.

2 19-Wire, Bobbin Bar & Disc Type Stranders, 10" spools. Built by Dixie Wire Machinery Co. 10 H.P. 220/440 volt motors. Good operating condition. Price each respectively: $7,000.00 and $9,000.00 F.O.B., Brooklyn, N. Y.

19-Wire 6" Bobbin Tubular Strander, built by New England Wire Machinery Co. Rebuilt in 1956. 10 H.P. 220/440 volt, 1160 R.P.M. motor. Good condition. Price: $4,500.00 F.O.B., Brooklyn, N. Y.

QUILLS and QUILL HEADS

22 Quill Heads and Sets of Quills—priced reasonably.

CLOSING MACHINE

6-Bobbin Planetary Closing Machine (6 strands and core). Built by Dixie Wire Machinery Co. 12 years old; used 5 years. 7½ H.P. variable speed motor. Good condition, except for cradles. No electrical controls. Price: $2,000.00, F.O.B., Brooklyn, N. Y.

SPOOLING BENCHES

6-Swift—$1,000.00; 4-Swift—$350.00; 6-Swift—$1,200.00. All F.O.B. plant.

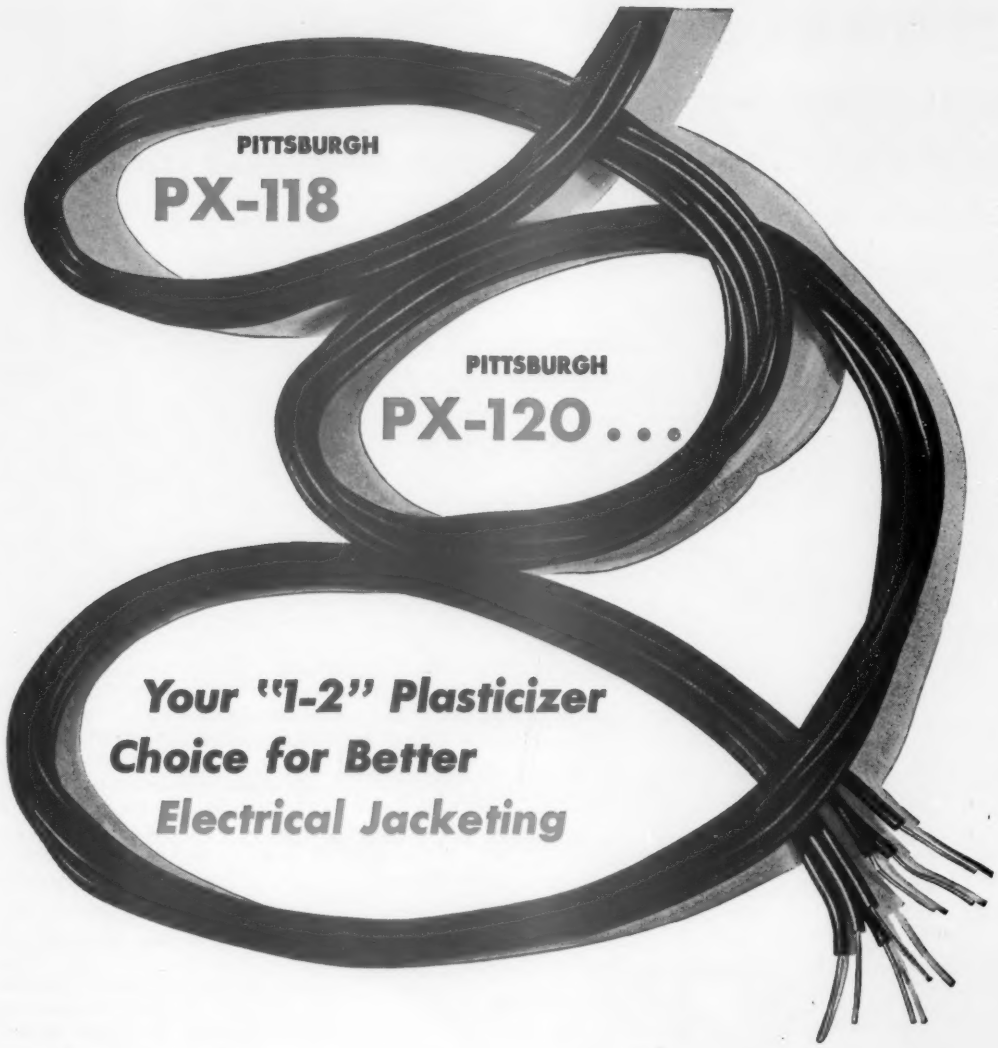
ALL MACHINERY MUST BE REMOVED FROM PREMISES NO LATER THAN 45 DAYS

Please contact us for details and appointment.

WIRE & TEXTILE MACHINERY, INC.

80 FOUNTAIN STREET • PAWTUCKET, R. I., U.S.A.

Telephone: PAwtucket 2-7750



IF YOU'RE faced with the problem of economically maintaining low volatility and good permanence in your vinyl wire jacketing formulations, then you should investigate these two Pittsburgh Plasticizers.

Pittsburgh PX-120 (DiIso Decyl Phthalate) offers low volatility properties which make it outstanding for use in high temperature extrusion processing. And its low specific gravity enables you to enjoy appreciable savings on a pound-volume production basis.

Pittsburgh PX-118 (IsoOctyl Decyl Phthalate) offers the same general advantages of PX-120: Low volatility, high resistance to elevated temperatures, good processing characteristics. Its lower first cost makes it the "best buy" when *economy* is your first consideration.

Both PX-120 and PX-118 can be supplied with Bisphenol A added for additional retention of elongation on aging. • *Write today for additional data on these two Pittsburgh Plasticizers.*

Send for Data Sheets
and Samples

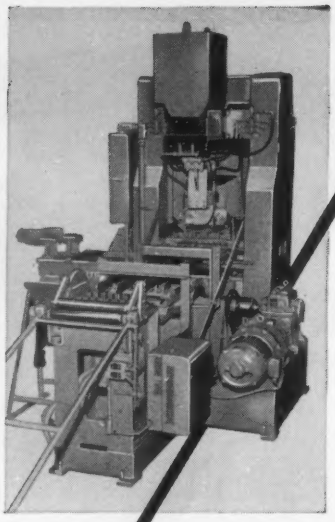
We'd like to acquaint you further with these two outstanding Pittsburgh Plasticizers. Write today for samples and technical data sheets.

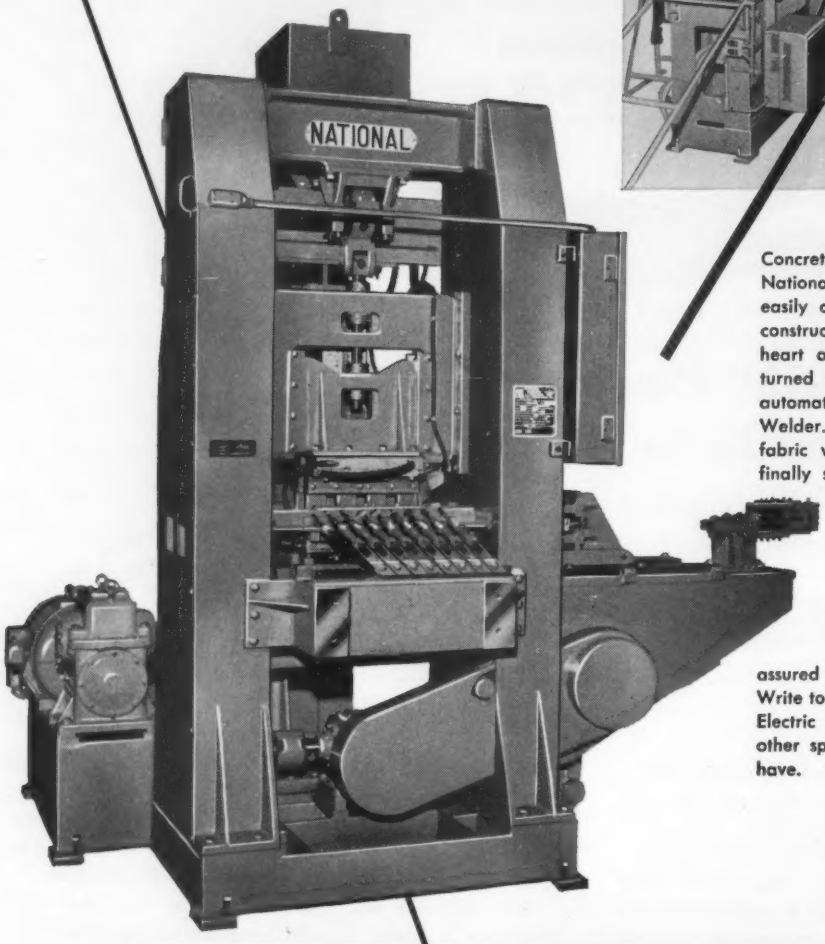
PLASTICIZERS • COAL CHEMICALS • PROTECTIVE COATINGS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

NATIONAL

Electric machine

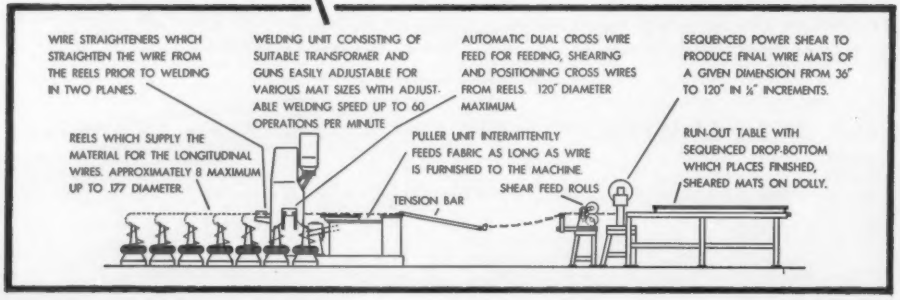
automatically feeds, welds, and stacks wire mesh for concrete plank





Concrete Plank, with wire mesh welded by a National Electric machine, is lightweight, strong, easily cut, and is solving many floor and roof construction problems in many installations. The heart of Concrete Planking, the wire mesh, is turned out at the rate of 60 feet per minute automatically by National Electric's Wire Fabric Welder. Starting with coils of line wire, the wire fabric welder first straightens, then welds and finally shears rectangular mats to the required size. After shearing, the top of the shear table divides and the mats fall on to a dolly, ready for use in Concrete Plank construction.

Profitable production, amazing savings in time, labor and cost-per-weld on any volume welding job, is assured with National Electric Automatic Welders. Write today for complete information on National Electric Automatic Wire Mesh Welders or any other special or standard welding job you may have.


WIRE STRAIGHTENERS WHICH STRAIGHTEN THE WIRE FROM THE REELS PRIOR TO WELDING IN TWO PLANES.
WELDING UNIT CONSISTING OF SUITABLE TRANSFORMER AND GUNS EASILY ADJUSTABLE FOR VARIOUS MAT SIZES WITH ADJUSTABLE WELDING SPEED UP TO 60 OPERATIONS PER MINUTE
AUTOMATIC DUAL CROSS WIRE FEED FOR FEEDING, SHEARING AND POSITIONING CROSS WIRES FROM REELS. 120" DIAMETER MAXIMUM.
SEQUENCED POWER SHEAR TO PRODUCE FINAL WIRE MATS OF A GIVEN DIMENSION FROM 36" TO 120" IN ¼" INCREMENTS.
REELS WHICH SUPPLY THE MATERIAL FOR THE LONGITUDINAL WIRES. APPROXIMATELY 8 MAXIMUM UP TO .177 DIAMETER.
PULLER UNIT INTERMITTENTLY FEEDS FABRIC AS LONG AS WIRE IS FURNISHED TO THE MACHINE.
RUN-OUT TABLE WITH SEQUENCED DROP-BOTTOM WHICH PLACES FINISHED, SHEARED MATS ON DOLLY.
SHEAR FEED ROLLS
TENSION BAR

51

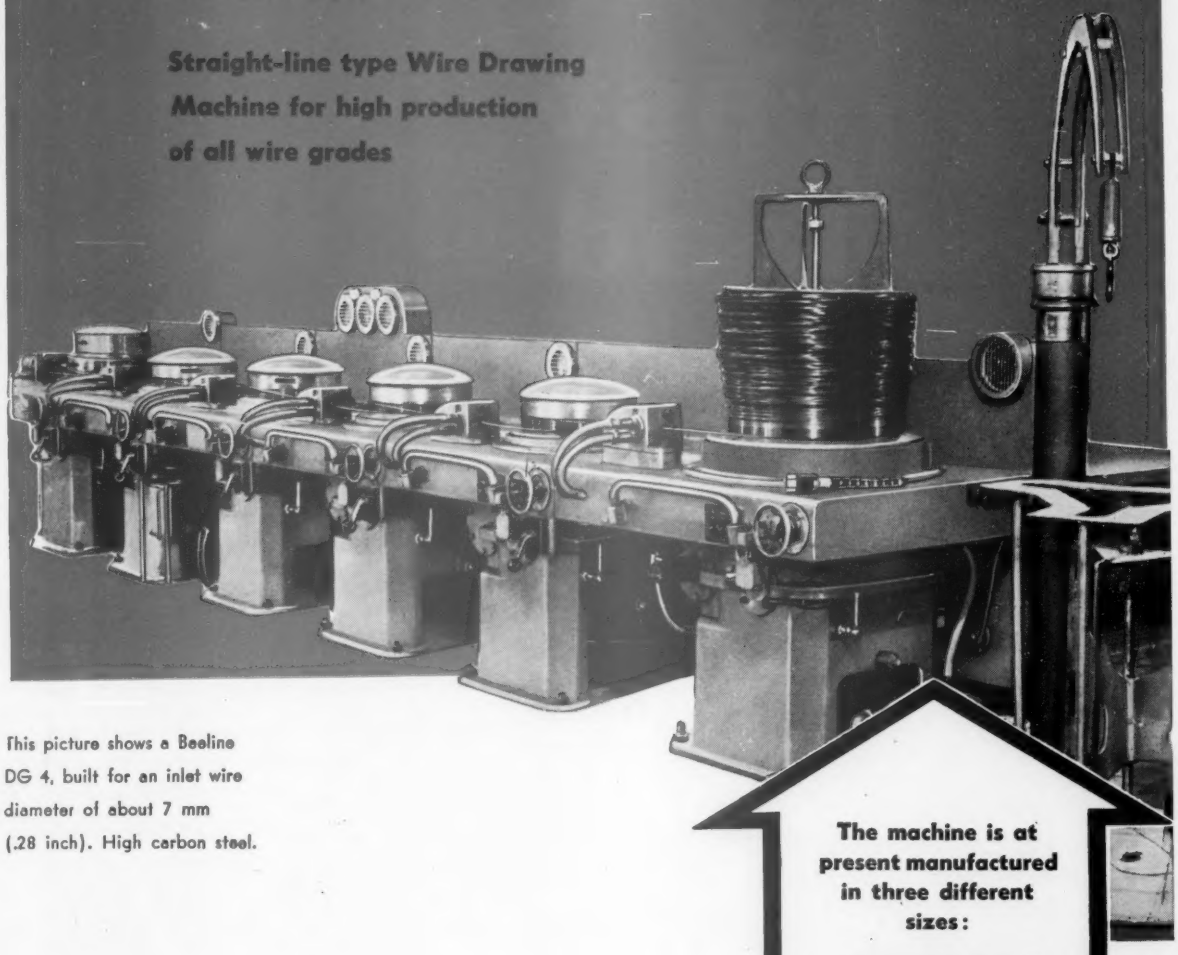
NATIONAL Electric welding machines co.

1880 N. TRUMBULL STREET
BAY CITY, MICHIGAN

25 YEARS EXPERIENCE DESIGNING AND BUILDING: SPECIAL & STANDARD • AIR • HYDRAULIC • MOTOR DRIVEN • SPOT • PROJECTION • SEAM • BUTT • FLASH • RESISTANCE WELDERS • PRODUCTION FIXTURES FOR ALL TYPES OF AUTOMATIC ARC WELDING.

THE BEELINE WIRE DRAWING MACHINE

Straight-line type Wire Drawing Machine for high production of all wire grades



This picture shows a Beeline DG 4, built for an inlet wire diameter of about 7 mm (.28 inch). High carbon steel.

Prominent Beeline features:

- Complete absence of slipping between wire and block.
- Direct block-to-block wire running, with automatic speed control and no loops or other mechanical adjusting devices.
- Continuous speed adjustment from almost zero up to maximum.

Let us help you solve your problems. We shall be glad to answer your questions promptly. Don't forget to let us know what wire is to be drawn, the inlet and finished diameter, its intended use, the production required, and all other relevant information (tensile strength of the finished wire etc.). Then we can suggest a machine that is just right for you.

The machine is at present manufactured in three different sizes:

BEELINE DG 5

for heavy wire, about 13 mm. (.500 inch)

BEELINE DG 4

for wire rods, about 7 mm. (.28 inch)

BEELINE DM 3

for wire with an inlet diawire of about 3 mm. (.116 inch)

MORGÅRDSHAMMAR

MORGÅRDSHAMMARS MEK VERKSTADS AB • MORGÅRDSHAMMAR • SWEDEN

Cables: Morgårdshammar, Ludvika. Tele: 0240–71100

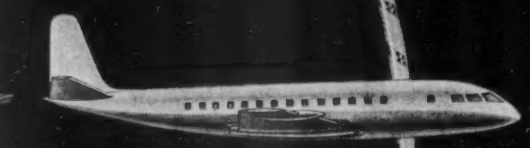
Sales Representative:

AB Nickels & Todsen, Stockholm 16, Sweden

Cable address: Nickelto, Stockholm

Fast lead

in difficult installations



Opalon* 1444 developed for thin wall insulation

Monsanto

*OPALON REG U S PAT OFF

What are your wire and cable insulation needs? Monsanto specializes in delivering vinyl compounds that meet and surpass your most stringent requirements.

The most recent case in point: the development of Opalon 1444 for thinner insulation walls for wire and cable used in aircraft installations and other areas where light weight *plus* exacting performance over a low to high temperature range are critical factors.

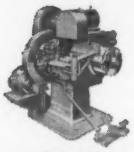
Opalon 1444, classified as semi-rigid, produces lightweight water-resistant insulation, with high crush resistance, greater compressive strength; it gives you long cable life with minimum maintenance.

There are 12 Opalon wire and cable compounds immediately available, others in late development stages. Call in your local Monsanto representative or write for *specific* answers to difficult problems, to Monsanto Chemical Co., Plastics Div. Room 541, Springfield 2, Mass.

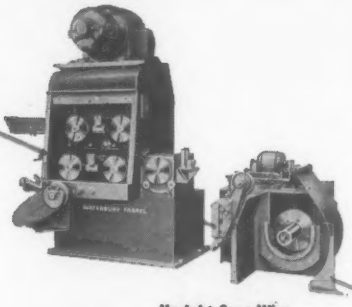
Over 60 Years Of Broad Experience As A . . .

SOURCE OF SUCCESSFUL WIRE MILL EQUIPMENT

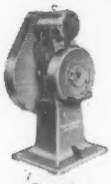
WATERBURY FARREL
FOUNDED 1851



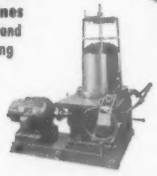
Sizing-Up Machines with Roll Pointers and Hand Swagers



Upright Cone Wire Drawing Machines For Intermediate and Fine Wire Drawing



Rotary Swagers

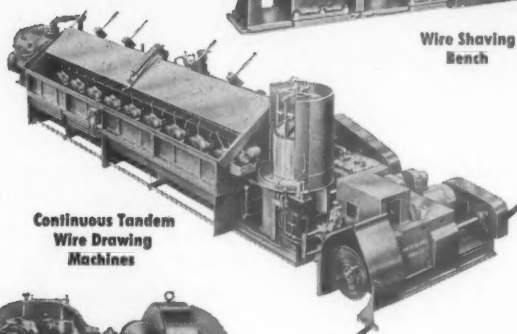


Vertical Bull Blocks

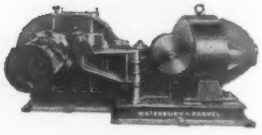
Horizontal Swagers

WF-35

Wire Shaving Bench



Continuous Tandem Wire Drawing Machines



Horizontal Bull Blocks

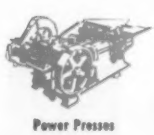
Write for free bulletins on the specific types of machines you are interested in.

WATERBURY FARREL

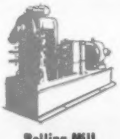
THE WATERBURY FARREL FOUNDRY & MACHINE CO.
Waterbury, Conn., U. S. A.
Branch Offices: Chicago • Cleveland • Millburn, N. J.

- BULL BLOCKS
- CONTINUOUS TANDEM WIRE DRAWING MACHINES
- HAND SWAGERS
- HORIZONTAL SWAGERS
- ROLL POINTING MACHINES
- ROTARY SWAGERS
- SLEEVE WIRE DRAWING MACHINES
- SPOOLERS
- STRING-UP MACHINES
- TRAVERSING WINDERS FOR FLAT WIRE
- UPRIGHT CONE WIRE DRAWING MACHINES
- WIRE FLATTENING MILLS
- WIRE SHAVING BENCHES

Bolt, Nut & Screw Machinery



Power Presses



Rolling Mill Machinery

Wire Mill Equipment

Sendzimir Mills and Other Special Machinery

This jewelry chain of **COPPERPLY®** wire might give you a gem of an idea!

• Copperply wire, a National-Standard development, is a steel wire, electroplated with copper to required thickness and with unmatched coating uniformity and concentricity.

It makes sense for jewelry chain manufacturers to use Copperply wire instead of copper or brass wire, because material costs are greatly reduced. It also provides an ideal base for plating if desired, it excells in strength, and provides more footage per pound with resultant production and handling economies.

To date other uses in light coating weights include: wrapping for piano wires, reinforcement for eyeglass temples, decorative tinsel, fanning mill cloth, and springs where a combination of power and electrical conductivity is needed. A major use in heavy coating weights is in the field of communications.

Here we touch only briefly on a few of the unique Copperply features, but perhaps enough to spark an idea worth exploring. And you'll find that the word "cooperation" has real meaning at National-Standard . . . whether your interest lies in Copperply wire or any of our other products. Try us.

NATIONAL NS NATIONAL-STANDARD Company NILES, MICHIGAN **STANDARD**

DIVISIONS: NATIONAL-STANDARD, Niles, Mich.; *tire wire, stainless, music spring and plated wires* • **WORCESTER WIRE WORKS, Worcester, Mass.;** *music spring, stainless and plated wires, high and low carbon specialties*
WAGNER LITHO MACHINERY, Secaucus, N. J.; *metal decorating equipment* • **ATHENIA STEEL, Clifton, N. J.;** *flat, high carbon spring steels* • **REYNOLDS WIRE, Dixon, Ill.;** *industrial wire cloth*

BLANE

COMPOUND

#2105

An announcement to everyone in the Wire & Cable Industry:

YOU SAVE ON WIRE INSULATION COSTS WITH THE NEW BLANE COMPOUND #2105!

- Blane Compound #2105 comes pelletized ready for extrusion in natural and all standard colors.
- Blane's quality is equal to the finest in the plastics industry.
- In Blane's laboratory, vinyl specialists are ready to assist you on any insulation problem.

BLANE

Blane offers the wire and cable industry a brand new vinyl compound — #2105 — which will save manufacturers on wire insulation costs. It is especially designed for operating temperatures of 90° and 105°C, and has been approved by UL. Examine Blane's Compound #2105 yourself! For samples and technical data write to —

THE BLANE CORPORATION

COMPOUND DIVISION • 38 PEQUIT STREET • CANTON, MASS.

Regional Die Center,
11177 E. 8 Mile Road, Detroit, Mich.—
headquarters for the
Metallurgical Products Department

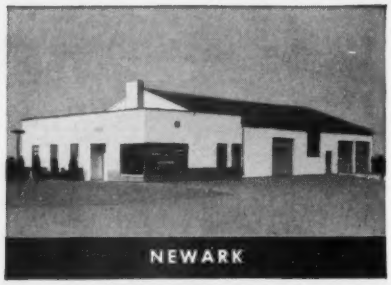
Regional Die Center,
704 Second Ave.,
Pittsburgh, Pennsylvania

Regional Die Center,
2106 W. Washington Blvd.,
Los Angeles, California

Wherever you're located . . .

Carboloy Die Agent
—Bronson & Bratton, Inc.,
5161 South Millard Avenue,
Chicago, Illinois

Carboloy Die Agent
—Allied Carbide Products, Inc.,
Hatboro, Pennsylvania



Eastern Metal Shop,
760 Colfax Ave.,
Kenilworth, New Jersey

you get fast delivery when you order Carboloy® die products

Carboloy Regional Die Centers and Die Agents now serve the wire industry from six strategic locations.

Standard Carboloy Dies and Die Products

You'll get speedy delivery from complete stocks in Chicago, Detroit, Los Angeles, Philadelphia, and Pittsburgh.

Fabricated Carbide Shapes

You'll get fast service on fabrication and finishing of special carbide shapes from Die Agents in Chicago and Philadelphia — and 4- to 6-day delivery on semi-standard and special shapes from the Eastern Metal Shop in Newark (Kenilworth), N.J.

Die Refinishing

In addition, you can get complete die-refinishing service plus technical assistance in Detroit, Philadelphia, and Pittsburgh. For your copy of the new Carboloy Die Engineering Manual, write: *Metallurgical Products Department of General Electric Company, 11171 E. 8 Mile Road, Detroit 32, Mich.*

CARBOLOY®
CEMENTED CARBIDES

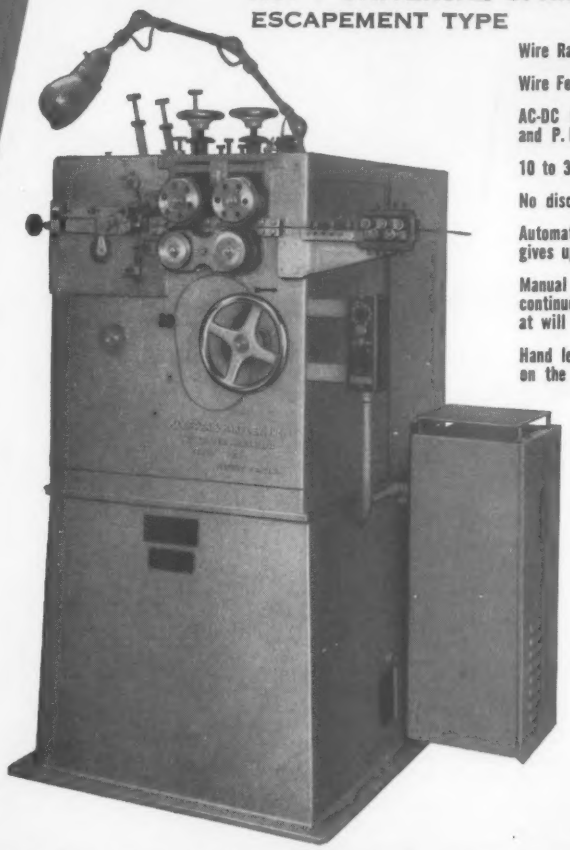
GENERAL ELECTRIC

SLEEPER & HARTLEY
Universal Escapement Coiler

This versatile new spring coiler is fast becoming the standard of the industry because of its many proven features — feed accuracy — wide range — high production — less maintenance. It will increase your production by as much as 50% or more.

Nothing stops and starts but the wire itself. The continuous rotation feature means fewer parts to give you trouble-free operation and less down-time for maintenance and repairs. Remember S & H machines are the product of years of intensive research and engineering. They are the most advanced coilers you can get for high speed production.

NO. 1 UNIVERSAL SPRING COILER
ESCAPEMENT TYPE



- Wire Range .018" to .080".
- Wire Feed Range 0 to 145".
- AC-DC Drive with rectifier control and P. B. Station.
- 10 to 340 ft. per minute feed range.
- No disconnecting drive clutch.
- Automatic cycling attachment gives up to 1020" of wire feed.
- Manual cutter control allows continuous coiling and cutting at will of operator.
- Hand lever releases feed roll pressure on the wire for tooling purposes.

SERIES 721
145" MODEL

Torsion tooling attachment for producing torsion type springs — available at extra cost.

S&H

SLEEPER & HARTLEY, INC.
BOX 1249, WORCESTER, MASS.

ORIGINAL MANUFACTURERS OF UNIVERSAL SPRING COILERS

Same operator...same product but thanks to Kennametal K8 unit costs have dropped 85%

With KENNAMETAL* Die Grade K8 . . .

Cost of MX® Abrasive Wheels dropped 2.64 cents per unit

Accurately kept production records of The Carborundum Company show that one set of Kennametal Grade K8 punches and die rings outlast *six* sets made from high speed steel. Cost of the punch and die rings, plus setup time and die regrinding time formerly added 3.1 cents per unit. By the introduction of Kennametal Grade K8 punch and die rings, this cost has now dropped to less than one-half cent per unit.

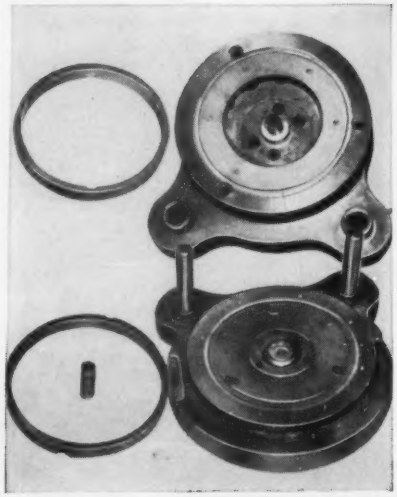
In addition to reducing your unit costs through extended die life and low maintenance, Kennametal Die Grades bring you additional benefits through their ability to hold close tolerances for greater product uniformity.

Why not find out what Kennametal can do for the critical wear parts of your operation. A Kennametal Die Engineer will gladly work with you in selecting and applying the Kennametal Grade that best meets your requirements. Get more information on the six grades of Kennametal's "90" series or the three exclusive, non-galling "80" series . . . a total of nine Die Grades developed to meet every die need, including yours. Call your Kennametal Representative, or write KENNAMETAL INC., Latrobe, Penna.

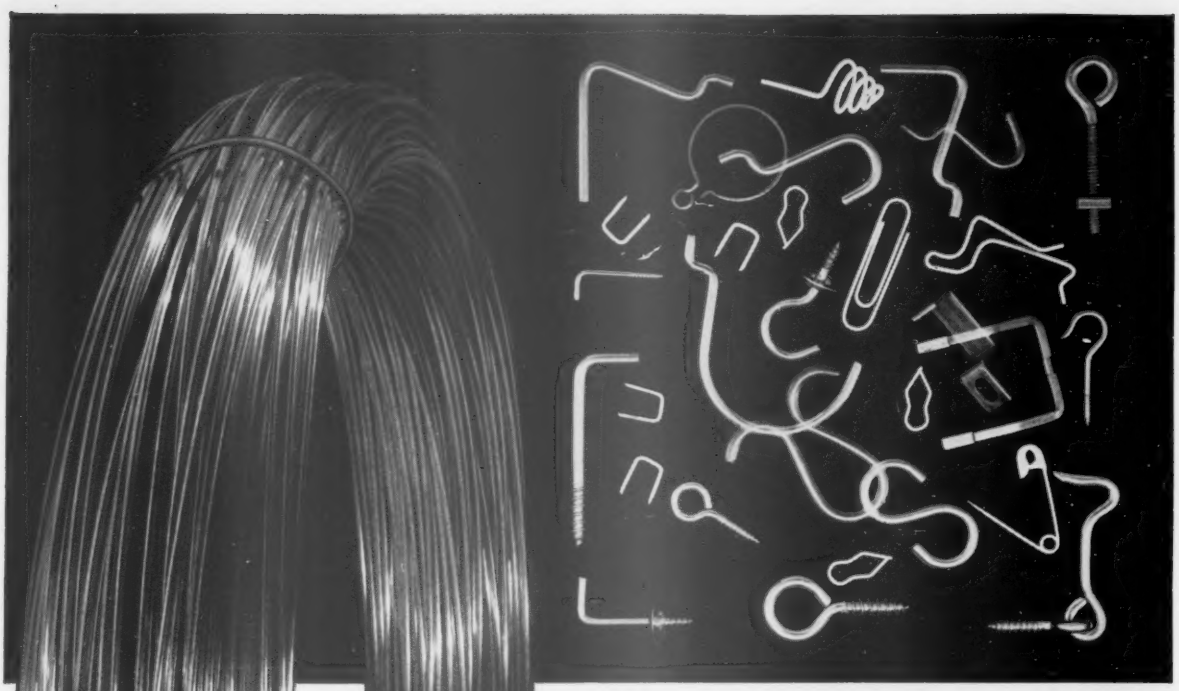
*Trademark

3102

INDUSTRY AND
KENNAMETAL
...Partners in Progress



Disassembled die used for blanking and piercing arbor holes in Carborundum's MX abrasive wheels. Kennametal Die Grade K8 is now used for both the piercing punch and the punch ring that forms the outer diameter of the wheel.



FABRICATE PARTS

easier, faster, better with

UNITED WIRE

When specs are tough, requirements rigid, savings essential, fabricate your parts with United Wire . . . aluminum, brass and copper alloys including 10-12-18% nickel silver. Here are the big important things you'll find in United Wire:

- Commercially bright — reduces finishing cost after forming.
- Tolerances — drawn or shaped to your most exacting standards.
- Temper — uniform throughout, every order, every time.
- Uniform coils — for trouble free pay-off.
- Size and shape — available in most sizes and shapes — round, square, flat and half-round.

Your "Wire Forms" can be fabricated easier and better at high speed production with low or no scrap loss by using "United" round or shaped wire.

UNITED WIRE
AND SUPPLY CORPORATION

PROVIDENCE 7, RHODE ISLAND

ALUMINUM, BRASS, COPPER WIRE AND TUBE - BRAZING ALLOYS AND FLUXES

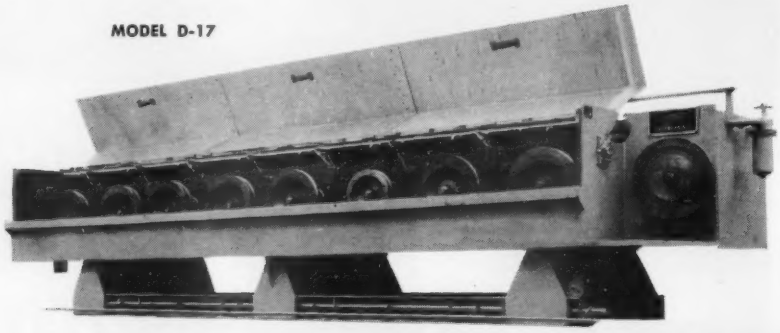
now, reduce 5/16" copper rod to #34 B&S gauge wire in only 2 steps

COOK

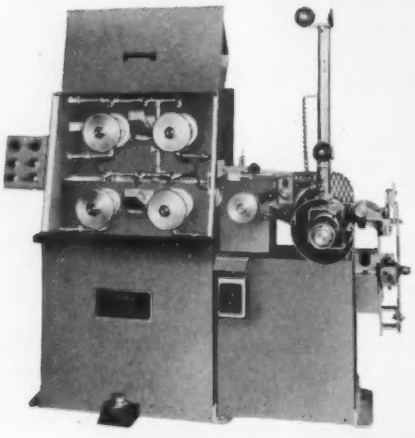
EQUIPMENT ELIMINATES 1 MACHINE LOWERS PRODUCTION COSTS

Now, with only 2 machines, in only 2 production steps, you can reduce 5/16" copper rod to #34 B&S gauge wire. By eliminating one step, you save the cost of one machine and the cost of producing unnecessary intermediate wire sizes. And, with these Cook machines, you'll produce the highest quality wire at speeds up to 5,000 feet a minute.

MODEL D-17



Maximum Size of Entering Rod	5/16" Copper 3/8" Aluminum
Finished Wire Size	No. 8 to No. 19 B&S Gauge
Maximum Operating Speed	5000 F.P.M.
Maximum Number of Dies	17
Number of Drawing Blocks	8
Maximum Size of Die Case	1½" dia. x 1" thick
Spool Capacity	1000 lbs.
Spool Traverse	11"
Spool Diameter	30"
Motor Size	150 HP



MODEL F-31

Maximum Wire Entering Size	#14 B&S Gauge
Finished Wire Size	#26 to #34 B&S Gauge
Operating Speed	5000 ft./minute
Maximum Number of Dies	16
Number of Drawing Shafts	4
Size of Die Case	1" x ½" thick
Motor Size	15 HP
Spool Capacity	40 to 90 lbs.
Spool Flange Diameter	8" to 12"
Spool Traverse	6" to 8"

WRITE OR PHONE FOR COMPLETE DETAILS

COOK MANUFACTURING CO.

50 EAST 25th STREET, PATERSON, N. J. * ARmory 4-6380

CANADIAN AGENT
E. V. LARSON CO., LTD.,
TORONTO, CANADA

EUROPEAN AGENT
CAPAMADJIAN LE MONNIER CIE LTD.,
PARIS, FRANCE

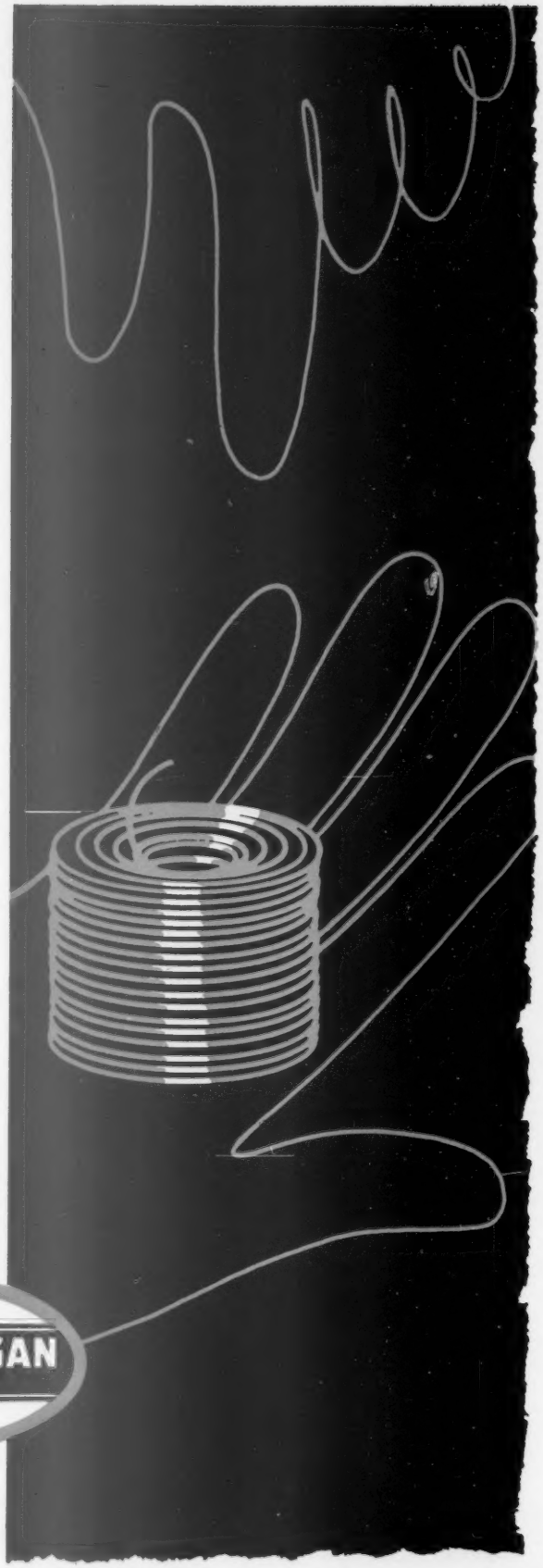
FORMVAR... proved and preferred

More than 70% of all magnet wire used today is coated with phenolic modified Formvar enamel. Wire enamellers, motor manufacturers and motor users rely on Formvar in their processes and in their products. Formvar has proved its value and has established an unsurpassed record of dependability.

Formvar is the registered trademark for polyvinyl formal resins produced and sold only by Shawinigan Resins Corporation. When combined with a phenolic resin it becomes that tough, heat resistant wire enamel popularly known as Formvar enamel . . . the industry standard.

For wire insulations which permit trouble free service, lower maintenance and production costs, and greater efficiency, look to enamels based on Formvar. Shawinigan's exacting production controls and applications research keep Formvar a uniform and dependable ingredient for magnet wire enamels. Shawinigan Resins Corporation, Dept. 5303, Springfield 1, Mass.

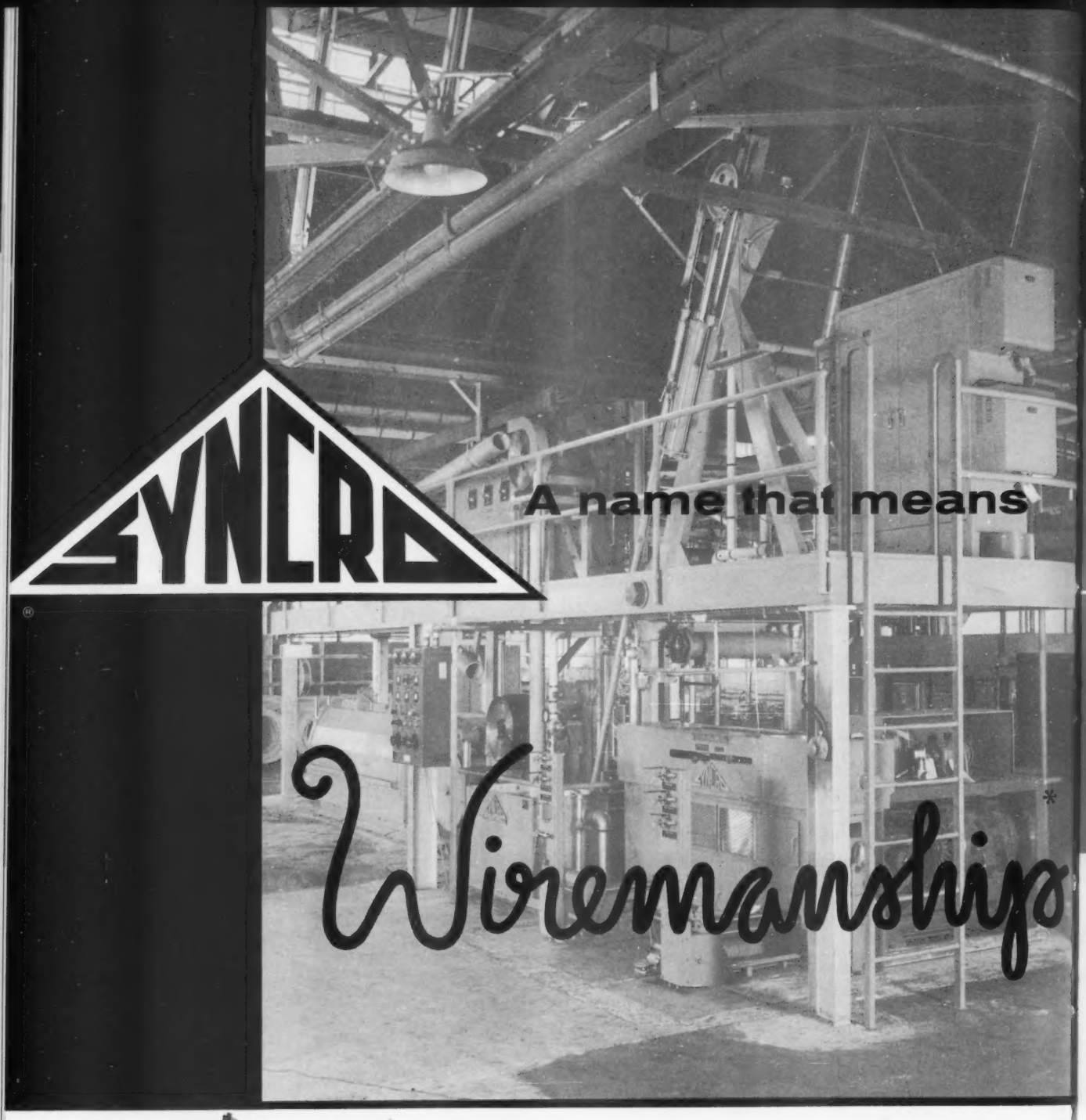
SALES OFFICES: ATLANTA CHICAGO LOS ANGELES NEW YORK SAN FRANCISCO SPRINGFIELD

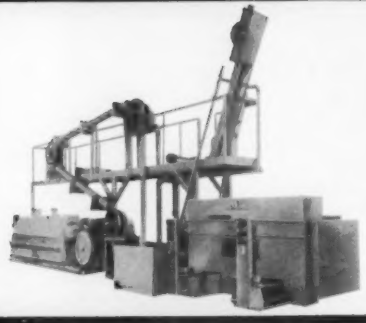


FORMVAR®

polyvinyl formal by

SHAWINIGAN RESINS





*Syncro has a new word for the wire industry . . . it's Wiremanship. It means leadership in design and manufacture of superior wire drawing equipment. Syncro's Continureel presents a production line picture of Wiremanship in action. To the left Continureel is shown operating as part of a continuous automated method of wire drawing, annealing, and spooling at highest possible operating speeds. Continureel is a Syncro exclusive . . . And so is Wiremanship.

Better Machinery for the Wire Industry

SYNCRO MACHINE COMPANY

Perth Amboy, New Jersey, U.S.A.

affiliated company: WINGET SYNCRO Ltd. Rochester Kent, England

WIRE DRAWING MACHINES • DIE STRINGERS • CONTINUOUS ELECTRIC ANNEALERS • PAYOFFS • CAPSTANS • WIRE INSULATORS

HEAVY DUTY TAKEUPS • TAPERS • SPECIAL MACHINERY

KEYSTONE XL WIRE STUDY

5 WAYS

TIME SCREW & MFG. CORP. finds KEYSTONE *XL* WIRE BEST!

No Surface Cracks

This is an insert for an engine rocker arm assembly. When cold formed from other wires, surface cracks appeared. Keystone "XL" Wire eliminated these cracks.

Maximum Head Spread

Here's a part formed to hold a rubber molding, where maximum head spread is demanded. Other wires cracked at the spread—Keystone "XL" Wire does the job.

100% Inspected

Time Screw inspects these engine tappets 100%. No fine line cracks on sides are acceptable. With Keystone "XL" Wire, rejection is less than ½ of 1%.

Double Extruded

To get the head of this automotive part to its desired size, Time Screw double extruded Keystone "XL" Wire. The head is about 10 diameters greater than the body.

Illustrated are five of the many ways Time Screw & Mfg. Corp., Rockford, Illinois, employs quality Keystone "XL" Wire to its best advantage.

As Leslie K. Pearson, Vice President of this progressive Rockford manufacturer, states: "We've found that Keystone 'XL' Wire can be used on any job, no matter how difficult."

Flowability is the secret, and the key, to the amazing adaptability of Keystone "XL" Wire. Its versatility is recognized by wire users who have turned to Keystone for assistance in solving their tough jobs. Next time you are confronted with a wire problem, call your Keystone Wire Specialist. You'll find him—as well as all members of the Keystone organization—ready and willing to assist you.

Keystone Steel & Wire Company, Peoria 7, Illinois

KEYSTONE
WIRE FOR INDUSTRY

Cold Heading Saves 70%

This fastener was formerly a two-piece set with a washer welded on the body. Now it is upset by Time Screw with Keystone "XL" Wire, saving 70% in costs.

KEYSTONE STEEL & WIRE COMPANY
PEORIA 7, ILLINOIS

Brand New . . . COLD HEADING FACTS FOLDER . . . send coupon today! New folder discusses uses, applications, methods, technical facts, wire requirements.

Name_____ Title_____

Company_____

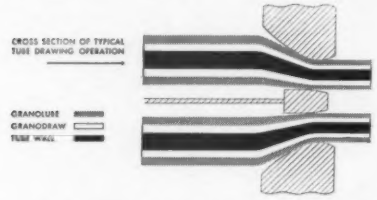
Street_____

City_____ State_____

CHEMICAL CONVERSION COATINGS and their functions in facilitating the cold mechanical deformation of metals

By ARTHUR DAHL, Product Development Dept., AMERICAN CHEMICAL PAINT COMPANY

When used to facilitate the cold mechanical deformation of metals (in drawing, extrusion, stamping, cold heading, necking, and upsetting operations) chemical conversion coatings in conjunction with suitable lubricants perform three important functions. One, they prevent metal-to-metal contact between work and tool. Two, they prevent galling and seizing. Three, they protect stock indefinitely, permitting the storage of in-process work at any stage of production, without danger of corrosion damage.



Characteristic of the tightly bound, highly absorptive, crystalline coating formed by the processes is the ability of the coating to retain lubricity throughout forming operations when treated with a suitable lubricant. This offers the following production advantages:

- **Higher degree of reduction**
- **Greater speed of draw**
- **Longer tool life**
- **Fewer process anneals and pickling**
- **Finer surface finish**
- **Cleaner mills**
- **Easier inspection of finished product**

Also of interest to production men is the exact duplication of coatings from batch to batch. And the processes are much simpler than other methods of coating metals—baths can be set up and running in less time than it takes to determine suitable coatings by other methods.

TYPES OF COATINGS AND THE METALS FOR WHICH THEY ARE DESIGNED

Zinc phosphate coatings for carbon steel. These coatings can be applied by either dip or spray systems.

Dip. ACP Granodraw No. 1 is typical of the dip process. The sequence includes precleaning, water rinse, pickling, water rinse, water rinse, Granodraw No. 1 solution, water rinse, and a hot neutralizing rinse. Surfaces to be treated must be free of oil, grease, rust and scale. The above sequence insures that they will be. And when metal is free of rust and scale, the pickling bath and two succeeding water rinses can be omitted. In either case, a lubricant like ACP Granolube or conventional lubricant must be applied prior to working the metal.

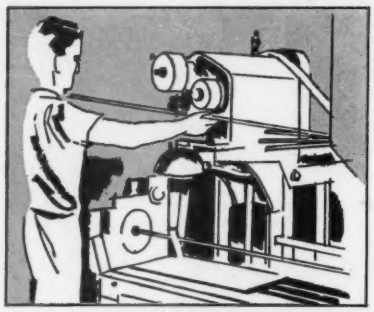
Spray. ACP Granodraw No. 4 is an example of the spray process. It usually requires 5-stage equipment and includes the following steps: precleaning, water rinse, Granodraw No. 4 solution, water rinse, lubricant. After chemical treatment, the work must be dried before forming.

Oxalate Coatings for the stainless steels and many of the high nickel alloys. These coatings are applied only by immersion process, and usually in a 5-stage system which includes an acid pickling or depassivating bath, a water rinse, the ACP Granodraw SS coating bath, a hot borax neutralizing rinse for wire stock, or a lubricating bath for tube stock. Since thorough activation of the metal surface is necessary to promote an adherent coating, the pickling and activating bath is an important stage in processing.

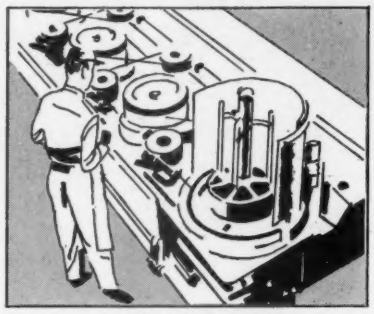
Fluoride-type coatings for zirconium and its alloys. Granodraw ZR is such a coating. It is applied in an immersion process which includes precleaning, water rinse, pickling, water rinse, Granodraw ZR solution, water rinse, drying or lubricating. It has been used primarily in the treatment of stock prior to wire drawing and tube drawing. Surfaces are cleaned of oil and grease by solvent degreasing or alkali cleaning. Pickling is required to provide a surface that is chemically and metallurgically receptive to the coating.

Strong alkali coatings for tantalum and amorphous phosphate coatings for aluminum. These two types of coatings are now in the development stage. Laboratory and field tests are being conducted, results are being evaluated, and modifications in chemical makeup and process sequence are being made to meet requirements. Several field tests, however, have indicated that they will do the same job for tantalum and aluminum processors as the other types of coatings have done for those working carbon steel, stainless steel, high-nickel alloy, and zirconium.

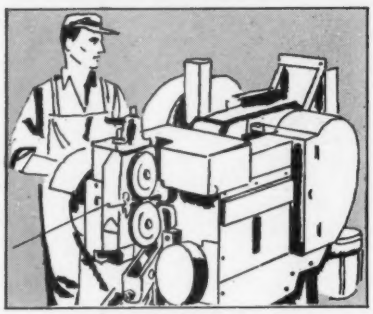
For more information write us at Ambler.



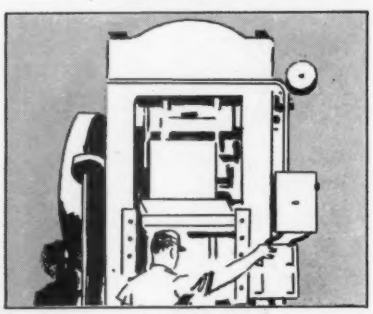
Tube Drawing



Wire Drawing



Cold Heading



Impact Extrusion

Note. Granodraw and Granolube are registered trademarks of American Chemical Paint Company.

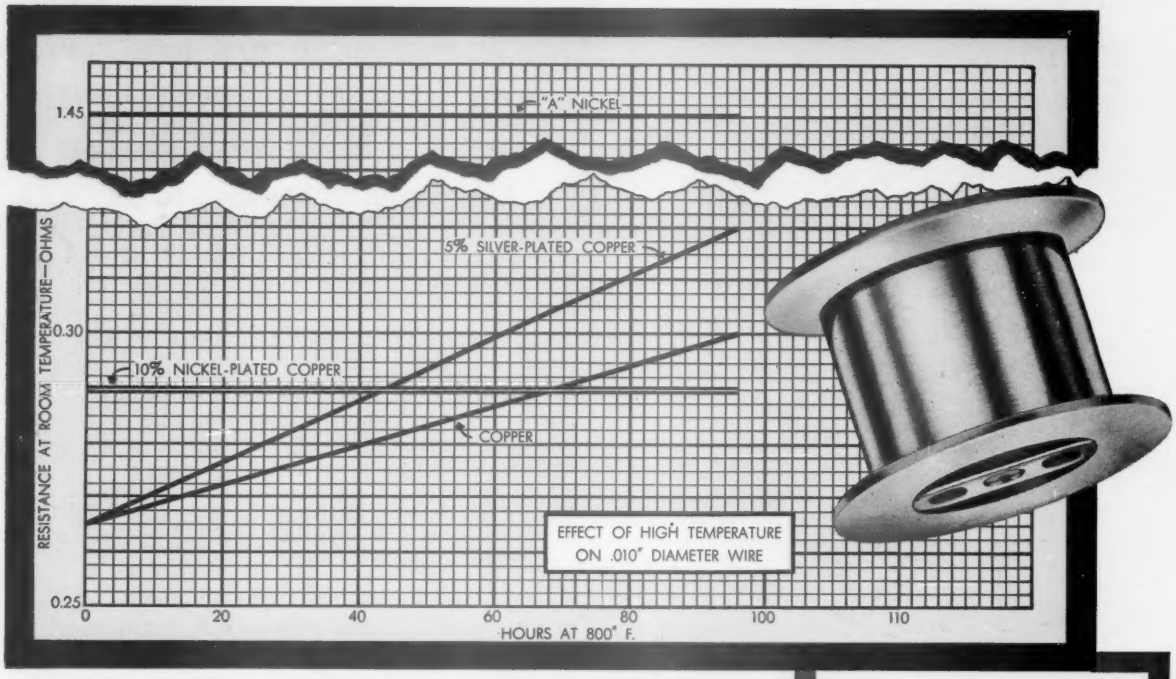
CHEMICALS ACP PROCESSES

AMERICAN CHEMICAL PAINT COMPANY

Ambler 30, Pa.

Detroit, Mich. • St. Joseph, Mo. • Niles, Calif. • Windsor, Ont.

New Chemical Horizons for Industry and Agriculture



Nickel-plated copper...

for high conductivity at elevated temperatures

SYLVANIA's Nickel-plated copper wire combines the conductivity of copper with the corrosion-resistant properties of nickel for applications involving temperatures ranging from 350° Fahrenheit to 700° Fahrenheit.

Equal lengths of Nickel-plated copper and three other wires were heated in air at 800° Fahrenheit for an extended period to determine the effect of heat on conductivity.

Nickel-plated copper, more than any of the other wires except for pure nickel, holds its original low resistance. It's this feature which, in many cases, has made Nickel-plated copper more desirable than costlier wires used where conductivity must remain constant under high temperature environment.

Nickel-plated copper wire can be supplied in a full range of diameters from .250" to .005".

Sylvania is the only major wire supplier with complete facilities for plating and cladding wire. This makes it possible to provide you with an experienced, objective recommendation as to whether a plated or a clad wire is best suited for your application.

In addition, Sylvania's Parts Division offers you complete 4-way service including custom molded plastic parts, small metal parts ranging from wire forms to deep drawn parts, and special electronic components. Write for the "Portfolio of 4-way Service" and the new technical bulletin on Nickel-Plated Copper Wire.

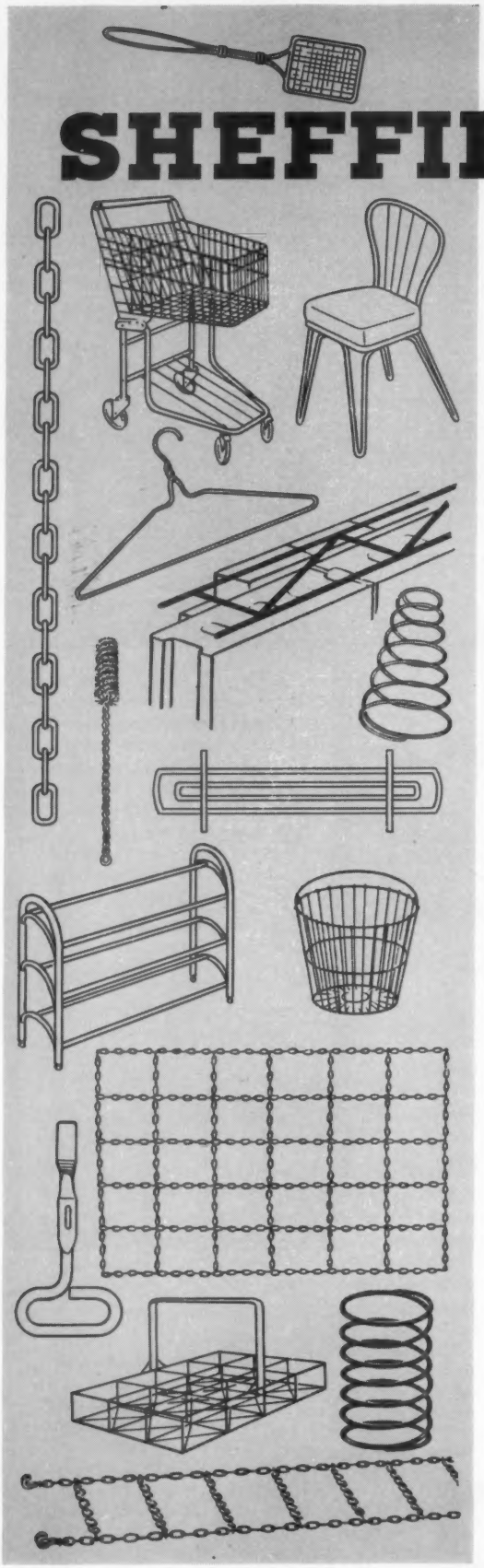
Sylvania Electric Products Inc., Parts Division, Warren, Pennsylvania

SYLVANIA

LIGHTING • TELEVISION • RADIO • ELECTRONICS
PHOTOGRAPHY • ATOMIC ENERGY • CHEMISTRY-METALLURGY

PARTS DIVISION

Custom Molded Plastics
Custom Metal Stampings
Custom Welded Parts
Custom Ceramic Composites
Alloy, Clad, Plated Wire
Plated Metal Strip
Electronic Components
Fluorescent Components



Why manufacturers use

SHEFFIELD WIRE

in more than 2,000 quality products

Manufacturers and fabricators depend on Sheffield Wire for unvarying quality and accuracy in meeting their wire specifications. They are sure of getting the RIGHT wire—and getting it fast—because of Sheffield's advanced quality controls and strategic plant locations.

We're old hands at helping customers solve wire problems—with results that speed production, cut costs and improve products.

Let our metallurgists and wire specialists analyze your wire uses. We'll not only come up with the right wire for you, but also may be able to recommend more economical ordering units. This service is yours for the asking. Just call your nearest Sheffield office.

SHEFFIELD KONE PAK*

gives you in one continuous spool the equivalent of 2 to 40 ordinary coils of wire. It gives longer continuous runs, less down time, and can cut scrap losses as much as 90%. The Kone Pak is mounted on a disposable wooden pallet, and can be packed in streamlined cardboard container if desired.

SHEFFIELD ARMCO® WIRE PRODUCTS

Coiled Wire

Annealed—#20 (.035" ga.) through 1"

Galvanized—#20 (.035" ga.) through #4 (.225" ga.)

Bright—#20 (.035" ga.) through 1"

Straightened and Cut Wire

Annealed—#20 (.035" ga.) through ¾"

Galvanized—#20 (.035" ga.) through #4 (.225" ga.)

Bright—#16 (.0625" ga.) through ¾"

★ Patent Pending

New ALUMINIZED WIRE
16 ga. (.0625") through 6 ga. (.192")
WRITE FOR FREE SAMPLE

SHEFFIELD DIVISION

ARMCO STEEL CORPORATION

SHEFFIELD PLANTS: HOUSTON • KANSAS CITY • TULSA

Naugatuck PARACRIL OZO

THE NEW OIL- AND OZONE-RESISTANT NITRILE RUBBER

Naugatuck's challenger for leadership in the field of ozone-resistant, oil-resistant rubber

Compared to the present leading competitive general-purpose oil-resistant, ozone-resistant rubber, Paracril® OZO vulcanizates show *marked superiority* in resistance to oil, fuel and weathering (ozone) and in color retention, abrasion resistance and low moisture absorption. In tensile strength, flame resistance and cost of complete compound, both are essentially the same.

Thus Paracril OZO provides a unique combination of properties far in excess of ordinary nitrile rubber!

But Paracril OZO is no ordinary nitrile rubber! It is a modified Paracril which incorporates the compounding discoveries of Naugatuck research chemists to which reference has been made in recent Paracril advertisements. The chief modifier is one of Naugatuck's Marvinol® vinyl resins, and the product includes excellent stabilizers for both vinyl and rubber.

Paracril OZO is supplied in the form of small, light-colored flakes, permitting easy handling and considerable flexibility in processing methods.

A most important feature of Paracril OZO is that the vinyl resin in it is completely fluxed during its manufacture. This not only eliminates a difficult compounding procedure on the part of the user but also assures full development of the added properties imparted by the vinyl modifier.

Its unique properties particularly recommend Paracril OZO for wire jackets, shoe soles, coated fabrics, automotive parts, hose and belting jackets. Write for Bulletin No. 219 which contains compounding suggestions and interesting test data on Paracril OZO vulcanizates.

Naugatuck Chemical

Division of United States Rubber Company

341P Elm Street
Naugatuck, Connecticut

Rubber Chemicals • Synthetic Rubber • Plastics • Agricultural Chemicals • Reclaimed Rubber • Latices • CANADA: Naugatuck Chemicals Division, Dominion Rubber Co., Ltd., Elmira, Ontario • CABLE: Rubexport, N.Y.

AUMANN
The New Winding Technique

TYPE SE 2

TAKE-UP and WINDING UNIT

WITH TORQUE CONVERTER FOR CONSTANT SPEED AND TENSION

The Take-up and Winding Unit Type SE 2 (Fig. 1) is designed to draw wire through treatment installations, such as lacquering ovens (magnet wire industry) or annealing furnaces, *at constant speed*, and subsequently to wind the wire onto bobbins or spools.

The Units can be used single (Fig. 1), or multiple mounted to a frame horizontally (Fig. 2) or vertically.
A number of special features, which hitherto have not been achieved with the conventional friction and slip clutch, are now achieved by the use of the AUMANN "Torque Converter" in conjunction with other reliable patented mechanisms:

- Constant tension is maintained over the entire diameter range of the spools.
- The desired tension can be adjusted through the use of a scale, without having to rely on "feel" or measuring devices.
- The torque is transmitted by a permanent magnet system which is absolutely free of wear and requires no maintenance.
- The wire is drawn off absolutely smoothly, without jerks or danger of overloading and damage, which are inherent with any type of friction clutch.
- The spools are correctly wound to meet all normal requirements.
- By providing each pass with its own speed control unit, optimum operation can be achieved since the speed of each pass can be adjusted to the various temperature zones of a furnace or oven. However, it is possible to dispense with individual drives and use one common drive for all passes.
- Maintenance is simple and easy, and does not require stopping the entire machine, as each unit is a complete winding machine, and the units are easily interchangeable.

Fig. 1 shows a single SE 2 Unit in vertical position, with Individual Drive, Tachometer for preset wire speed, and Yardage Counter which actuates an acoustic and optical signal when the preset number of yards has been reached and the spool should be changed.

Fig. 2 shows six Units, without tachometer or yardage counter, mounted horizontally onto a frame. As frames of this type can be made in left-hand or right-hand versions, the same number of units can be mounted on each side, either horizontally or vertically, which in this instance would result in a 12-unit Take-up Frame. Any number of units can be assembled for any practical application in the most space-saving way.

The Spooling Unit alone, with its Precision Layer Winding Mechanism, can also be used without the take-up capstan for other applications; for example, behind extrusion machines for plastic-coated wire, yarn, etc.
For certain purposes, such as the processing of lacquered wire, testing equipment for continuous testing of the wire can be installed.

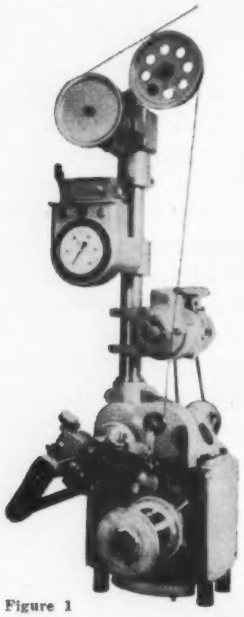


Figure 1

TECHNICAL DATA

Wire ranges: (referred to soft annealed copper wire)
0.04 - 0.25 mm (0.0015" - 0.0098")
0.15 - 0.40 mm (0.0059" - 0.0157")
0.20 - 0.60 mm (0.0078" - 0.0236")
0.30 - 0.80 mm (0.0118" - 0.0315")
0.50 - 1.00 mm (0.0196" - 0.0394")

Traverse: AUMANN Precision Layer Winding Mechanism, with infinitely variable pitch and traverse.

Speed, depending on the wire diameter:
7.5 - 150 meter/minute (24.6 - 492 ft./min.)
Higher speeds on special order

Maximum speed range: 1 : 5

Maximum spool sizes:
200 mm (7.87") flange diameter
160 mm (6.30") total width

Minimum distance between spools: 250 mm (9.8")

Power requirement:
approximately 0.2 KW per unit

Space requirement:
25 x 100 x 55 cm (9.8 x 39.3 x 21.6 inches)

Booth 4407-9
RADIO ENGINEERING SHOW
New York Coliseum
March 24-27

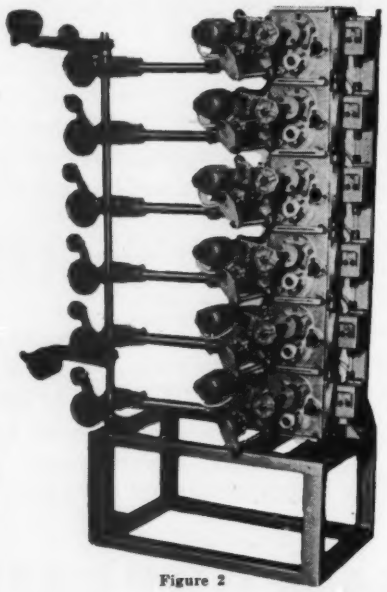
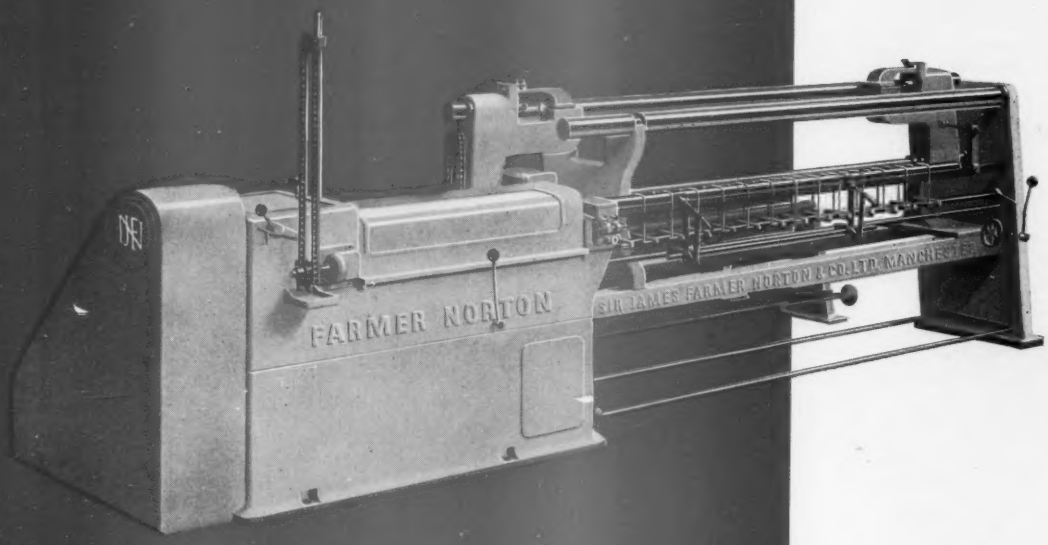


Figure 2

INDUSTRIAL WINDING MACHINERY CORPORATION

SUITE 3410, 120 WALL ST., NEW YORK 5, N. Y.
Telephone: WHitehall 3-1754



Farmer Norton

CHAIN LINK WEAVING MACHINES

Incorporating the NEW Blashill gear box

MARK 1. Width up to 7 foot maximum fence.

MARK 2. Width up to 12 foot maximum fence.

Capacity from 6's to 14's gauge wire in 1¼" to 4" meshes.

Practical output on suitable wire: 2" mesh on 4 foot netting height up to 1750 square feet per hour.

SIR JAMES FARMER NORTON & CO. LTD.

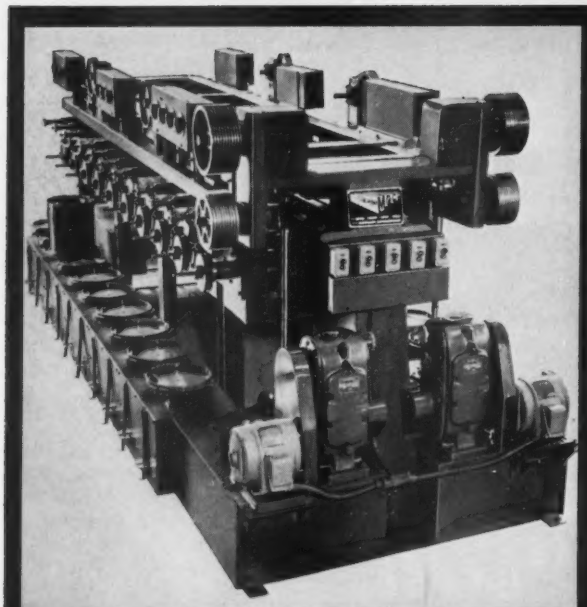
ADELPHI IRONWORKS, SALFORD 3, MANCHESTER, ENGLAND

PHONE: BLACKFRIARS 3613-4-5

GRAMS: AGRICOLA, MANCHESTER

MAKERS OF WIRE DRAWING, WEAVING MACHINES AND ACCESSORIES

NEW

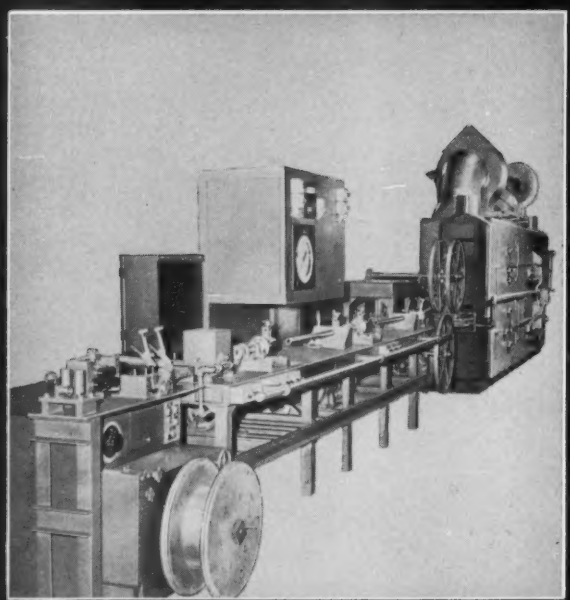


New Reel-R-Drum Packer handles two wire sizes simultaneously at different speeds through the same process.

MOCO's new Reel-R-Drum Packer is setting production records in forward-looking companies. This versatile unit has a speed range from 20 to 120 feet per minute. You can produce two wire sizes simultaneously through the same process at different speeds. Handling wire sizes ranging from .0089" to .025" in diameter, this MOCO Reel-R-Drum packages annealed copper magnet wire on different reels or in nominal 100 lb. capacity Payoffpak Drums, or both simultaneously. This versatile unit is built for tandem operation with a high speed MOCO type "C" wire enameling machine.

New MOCO Machine applies 2 servings of glass or yarn and 4 coats of baked insulating varnish

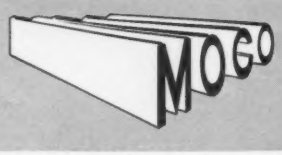
Satisfied users acclaim this new insulating, impregnating and varnish baking machine as a completely revolutionary development in the field of wire enameling. It is capable of turning out large quantities of heavy rounds and rectangulars (up to 150 M. Sq. Mls. Cross Sectional Area), baking on 4 coats of insulating varnish and applying two servings of glass or textile yarns . . . simultaneously! MOCO's revolutionary Rapid-Cool Oven lets you stop production without damage to wire in the oven. Return to full production in a matter of seconds because of the rapid rise of the temperature inside this MOCO Tunnel Oven.



FOR MORE INFORMATION

MICHIGAN OVEN COMPANY

425 BRAINARD • DETROIT 1, MICHIGAN WI-58



Coulter & McKenzie D-PAKer shown above

EASY LOADING • EASY DISPENSING • EASY STACKING

Forget about the time and trouble involved in splitting, tying and wrapping wire! Continental's Payoffpak accommodates up to 100 pounds of fine wire as fast as it's drawn or annealed. This is the most practical—and most economical—way to pack, ship, store and dispense fine wire, ferrous or nonferrous. Superbly lithographed by Continental to do a real selling job for you, Payoffpaks are economically priced for one-time use. Call or write Continental *today*.

CONTINENTAL CAN COMPANY

Eastern Division: 100 E. 42nd St., New York 17
Central Division: 135 So. La Salle St., Chicago 3
Pacific Division: Russ Building, San Francisco 4

Payoffpak has a sturdy bail, smooth slick interior, and necked-in bottom for secure stacking. No need of reels or wide range of block sizes in filling . . . longer length of continuous strand means reduced downtime for your customers.

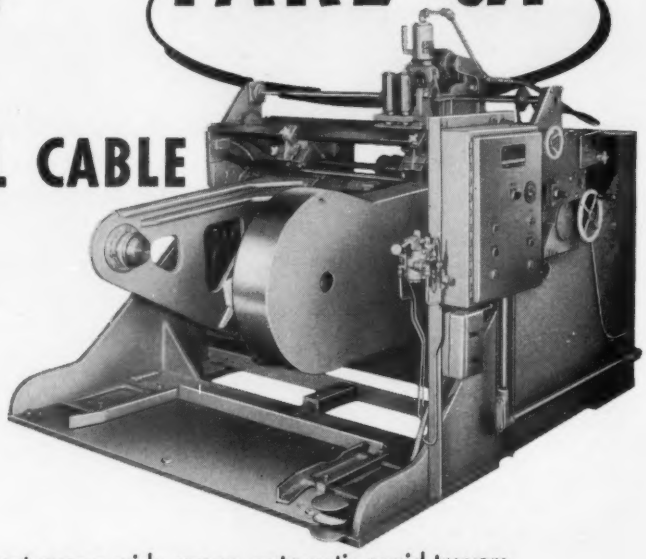
EITHER LUG OR RING SEAL TYPE CLOSURE PROVIDES TRUE AIRTIGHT SEAL!

A NOW

HEAVY DUTY SHAFTLESS TAKE-UP

Especially Adapted for handling –

STRANDED STEEL CABLE



This unit has been engineered specifically for heavy application as a take-up for wire drawing, annealing, cabling and any other requirements where a take-up in a heavy duty class is an integral part of the operation. All components from the heavy fabricated frame to the drive are designed to meet the maximum load requirements to which this unit will be subjected.

It comes equipped with a powerful mechanical traverse with infinite lay adjustment over a wide range, automatic rapid traversing, for positioning at starting side and incorporating a hydraulically powered cable cutoff. Also, mounted on the traverse is a clamping and feed in roll assembly for the purpose of feeding the cut end of cable to the operator.

The dual pneumatically operated reel arms provide for ease in reel handling and are also readily adjustable for varying reel widths. The lifting of the reels into running position is accomplished hydraulically and has a lifting capacity of 10,000#.

This unit can come equipped with drive and controls to provide constant tensions throughout full reel buildup, extra pintles which are easily interchangeable and is available in standard models of 48", 60" and 72" maximum reel diameters.

Write for

SPECIFICATIONS

ENTWISTLE

Manufacturing Corporation

1475 ELMWOOD AVE., PROVIDENCE 7, RHODE ISLAND

Over 40 years of dependable service to the Wire Industry

ANNOUNCEMENT

To Serve You Better

HUBBARD SPOOL COMPANY

JOINS FORCES WITH

The American Pulley Company

and becomes its HUBBARD SPOOL DIVISION

The Hubbard Spool Company has spent 50 years specializing in the manufacture of spools of all types—metal, wood and plastic—and is a nationally-known leader in this field. The American Pulley Company likewise has for many years been a factor in producing pressed-steel reels.

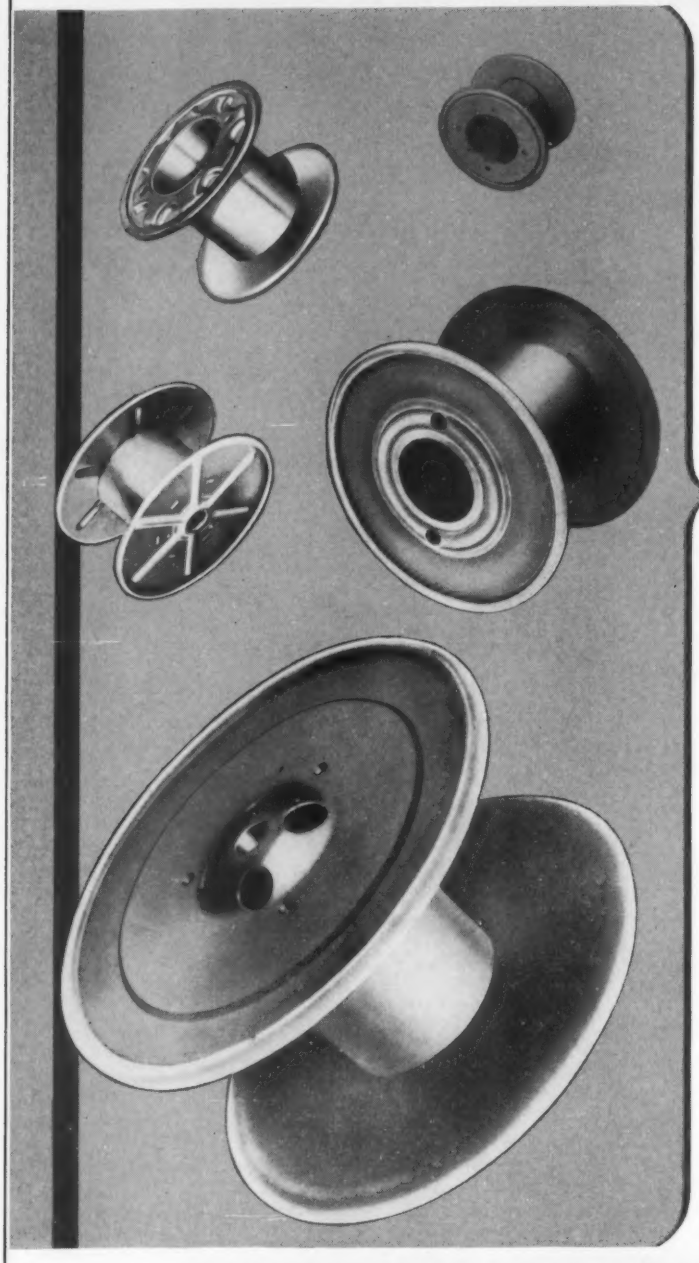
The combined companies will offer users of spools and reels a wider variety of types of construction and sizes and expanded product development and engineering service.

Manufacture of the Hubbard products will continue as formerly at the Garrett plant, with no changes in sales and executive personnel. Pressed-steel reels will continue to be fabricated at the Philadelphia plant.

All sales of spools and reels will be handled by the Hubbard Spool Division; for best service, address inquiries to Garrett, Indiana.

OVER PLEASE

HUBBARD HAS IT . . .



IF IT'S A SPOOL OR REEL
HUBBARD MAKES IT!

Every type: Steel, Wood, Plywood, Masonite, Cardboard, Aluminum, Plastic.

If your requirements call for Spools or Reels, Call Hubbard.

Many types and constructions of Steel Spools and Reels for Shipping and Processing use in plain, painted or plated finishes.

In addition to our expanded line of standard sizes, we also have facilities and equipment for producing custom-designed Spools and Reels to your specifications.

The combined manufacturing, engineering and sales facilities of Hubbard and American Pulley are ready to serve your every spool and reel requirement.

Address your inquiries to:

HUBBARD SPOOL DIVISION

OF

The American Pulley Company

GARRETT, INDIANA

Telephone: Garrett 840

The Wire Outlook

While the production of steel in February was low, running in the neighborhood of 50% of capacity, it is stated that the pattern is already showing some improvement. Inventories generally are low and some forward buying is in anticipation of increases in prices.

In the face of the lull in business, the American Iron and Steel Institute reports that steel companies plan to spend about one billion dollars in 1958 for additions to and replacements of facilities. Last year one and three quarters billions was so spent, the largest amount in any one year since 1945, bringing present capacity to 140.7 million tons a year.

The "easier money" policy is beginning to take effect. This, plus increased Federal spending and a spurt in residential building, is the ground for the Administration's expectation of an early upturn. Business may increase a little by mid-year, but no major improvement should be looked for before the Fall months.

Offsetting the favorable factors is the rise in unemployment in February to nearly 4.5 million, an increase of 1.1 million over December. The stock market as well as business activity appears to have touched bottom and while business may stay substantially on a level for several months, any change now is likely to be on the credit side of the ledger. An auto strike, if it materializes, may extend the period of doldrums.

Consumer spending will be an important element in things to come. Last year it rose some 5% over 1956 and there is no sign that the American consumer, barring the unemployed, is becoming panicky and curtailing purchases. Car sales have been poor, except for the imported economy types, and the Spring response to vigorous sales efforts will tell a tale. Personal income in December, the latest figures available, stood at $343 billion, as against the record of nearly $347 billion last August.

While wire buying has been slow, with cold heading and spring demand light, some improvement in merchant wire product orders is due, together with a moderate improvement in manufacturers' wire sales. Some producers have booked encouraging increases for March. The inventories of fabricators are practically nil and buying is mostly for immediate needs, with deliveries on a two-week basis.

An extension of the Trade Agreements Act has been proposed, under which the President would be empowered to enter into pacts to lower duties further. The new law, if enacted, will contain an escape clause, providing for effective consideration of serious injury cases.

Since important segments of the wire industry are now suffering from the low price competition of imported rod, wire, wire products and wire machinery that are produced at wage scales under ours, this would seem to be the time for injured facets of the industry to register their difficulties with Congressional representatives in an effort to seek equalizing adjustments.

A schedule of what may be anticipated in coming months has been worked out indicating that the forepart of the year will be our poorest period; in the Spring there will be a leveling off, with jobs picking up toward its end; the Summer should show a moderate improvement; late in the year there will be a marked betterment in business; and in 1959, the beginning of a new era of prosperity.

We can look forward with reasonable confidence to the future. The morale of the public is good and if the spirit of optimism continues, intelligent application and hard work most surely will prevail over current conditions.

Edmund Duval Sickels
EDITOR

STEELSKIN

IF *you need a drawing lubricant or a coating compound...*

Whether you need a *powder,* or a *grease* . . . whether it's to be used for *wet* or *dry* drawing . . . you want a *dependable* product.

That's why it's just good business to buy a **STEELSKIN** product. You see, we have just *one* business. We're *specialists* in making wire drawing lubricants. We've learned how — in our many years of specialization — to insure the exceptional performance, the fine, consistent quality of the **STEELSKIN** lubricants we manufacture for you.

What's more, our men in the field . . . the men who call on you, are *specialists* too. They're equipped to help you on any wire drawing problem.

So, when you buy metal working lubricants . . . *why not buy dependability?*

Buy STEELSKIN!

Steelskin
REG. U.S. TRADE MARK

R. H. MILLER

COMPANY, INC., Homer, N. Y.

METAL WORKING LUBRICANTS

WIRE
AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip.
DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 33 MARCH, 1958 No. 3

Commodity Price Trends— Steel, Copper and Aluminum

by David Williams
Manager, Cable Bureau
Consolidated Edison Company of New York, Inc.
New York, New York

Prices of commodities are of universal interest, and changes in prices are the most important force in shaping our economy. Of the 1200 commodities and products comprising the Wholesale Commodity Price Index of the U. S. Bureau of Labor Statistics, the Group with which Public Utility Purchasing Agents are most directly concerned is the Metal and Metal Products Group. The relative price action of this Group with respect to the All Commodity Index is shown in Chart A. Of the Group, the most important metals are: Iron and Steel, Copper and Aluminum. They will be discussed in that order.

This paper was delivered by Mr. Williams before the Public Utilities Buyers Group, National Association of Purchasing Agents, at Philadelphia, Pa., on February 4, 1958.

Iron and Steel

Since the Stone Age, the history of the progress of Mankind has been identified with the history of metals. Iron is by far the most important metal used by man, and will remain so for an indefinite period in the future. It comprises 5% of the earth's crust, and was said to have been discovered on Mt. Ida, on the island of Crete, when a fire caused by lightning produced a conflagration in the woods, which was hot enough to smelt the ores in the mountain. Vulcan is said to have worked the newly discovered iron mine and to have wrought iron implements for the gods.

★ ★ ★

Iron ore, coal and limestone are the chief raw materials of pig iron. Iron ore was first mined in the U. S. in the early part of 1608, at Jamestown, Va., and the manufacture of pig iron began about 1620 at Falling Creek, 76 miles from Jamestown, Va. A blast furnace built near Lynn, Mass. in 1643 produced 8 tons of pig iron per week. In 1956, U. S. production of pig iron was 78,000,000 tons and World production totalled 220,000,000 tons. The first iron rails rolled in the U. S. came from Mount Savage, Md. in 1844.

★ ★ ★

When pig iron is refined, the resulting metal becomes much harder and more elastic, and is called steel. The manufacture of steel as a commercial commodity in the U. S. began in Connecticut in 1744. By 1810, production had increased to 900 tons, of which, 531 tons were made in Pennsylvania. In 1956, U. S. production of steel was 115,000,000 tons and World production totalled 308,000,000 tons. The U. S. is the largest producer of steel in the world, and the Steel Industry is the largest manufacturing industry in the U. S. The quantity of steel produced is 20 times that of all other metals combined. About ¼ of the total freight hauled in the U. S. consists of raw materials used in the production of steel and the products of the iron and steel industry. The principal users of steel are the automotive and construction industries, followed by containers and the railroads.

William Kelly, in 1847, at the Eddyville Iron Works, Lyon County, Ky., was the first to refine pig iron by forcing a blast of air thru the molten metal which was contained in an acid-lined vessel. This process of steel making was named the Bessemer process after **Sir Henry Bessemer,** who obtained an English patent in 1855, Kelly's U. S. patent being granted in 1856. The first commercial production of Bessemer steel in the U. S. was in September 1864 at the Wyandotte Works, Mich. and the first steel rails were rolled in May 1865, by the North Chicago Rolling Mill from metal furnished by the Wyandotte Works.

★ ★ ★

The first acid open-hearth furnace for steel making was built in 1868 for Cooper, Hewitt & Co. at Trenton, N. J. Acid-steel is made in vessels or furnaces lined with highly silicious material, and, therefore, requires pig iron low in phosphorous. But 90% of the iron ores of the world are high in phosphorous, hence a new process was required. In 1879, **Sydney Gilchrist Thomas,** an Englishman, discovered that by using a basic (dolomite or magnesia) lining he could use these phosphorous rich ores in steel-making. While manufacture of basic open-hearth steel in the U. S. was first begun in 1884 by the Pennsylvania Steel Company, at Steelton, Pa., the first commercial production was at the Homestead Steel Works of Carnegie, Phipps & Co. Ltd., near Pittsburgh, Pa., in March 1888.

★ ★ ★

Most steel today is made in the open-hearth furnace, which permits greater control over the metallic bath than the older Bessemer process, which, though faster, cannot be so easily regulated, and leaves some sulphur and phosphorous in the metal. In recent years, electric furnace steel has been developed for the production of stainless steel and other alloy steels. In present day steel making, about half the furnace charge is pig iron and the other half scrap, of which half comes from steel mill scrap and half from purchased scrap iron and steel.

★ ★ ★

To supplement our declining reserves of high grade iron ore, most of which are in the Lake Superior district, large deposits have been developed in Venezuela and Labrador - Quebec, which first came into production in 1954. Taconite, a very hard low grade iron ore, the reserves of which are almost inexhaustible, is being rapidly developed. Development of the jaspers of Michigan and a substantial reserve of titanium-bearing iron ore in Alaska is being pushed.

★ ★ ★

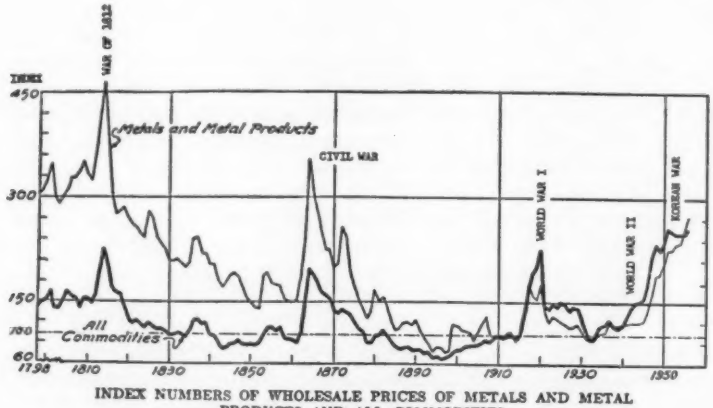
Chart I, Quarterly pig iron prices from 1784 to date, shows that they have ranged from an all-time high of $71.66 during the Civil War to an all-time low of $11.35 per long ton in 1898. They rose to a peak of $52.89 during World War I and then fell to $15½ per ton in 1932-3, from which level they have risen to a high of $65.73 during the 3rd quarter of 1957. But, with the steel mills operating at less than 75% of capacity, a declining demand and falling scrap prices, the outlook is for lower iron and steel prices. This conclusion is reinforced by the cyclic studies of **Edward R. Dewey,** Director, Foundation for the Study of Cycles, which indicate a peak in the 1st quarter of 1957 followed by a decline to the 3rd quarter of 1960.

★ ★ ★

A further indication of a forthcoming decline in iron and steel prices is foreshadowed in the studies of **Professors Gans, Myers** and **Pearson** of Cornell University in "Farm Economics" for July 1957. Figure B, reproduced through the kind permission of **Dr. F. A. Pearson,** Emeritus Professor of Prices and Statistics, Cornell University, shows a strikingly close relationship between changes in world monetary stocks of gold and wholesale prices of 30 basic commodities on a gold basis, 13 years later. The general trend in prices of these 30 basic commodities is approximately the same as the All Commodity Index shown on Chart A.

Copper

Copper is generally regarded as the most important of the nonferrous metals. In tonnage and in value of ore produced in the U. S., copper is surpassed only by iron. Furthermore, the U. S. has been the largest copper producer and consumer in the world thruout the past three decades. Copper's



INDEX NUMBERS OF WHOLESALE PRICES OF METALS AND METAL PRODUCTS AND ALL COMMODITIES
1910-14 = 100.
CHART A

SOURCE:- 1798-1932 - WARREN & PEARSON
1933 TO DATE - U.S.B.L.S.

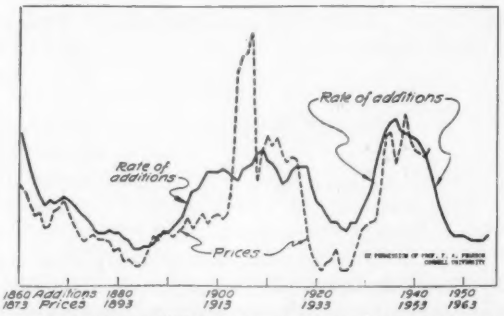
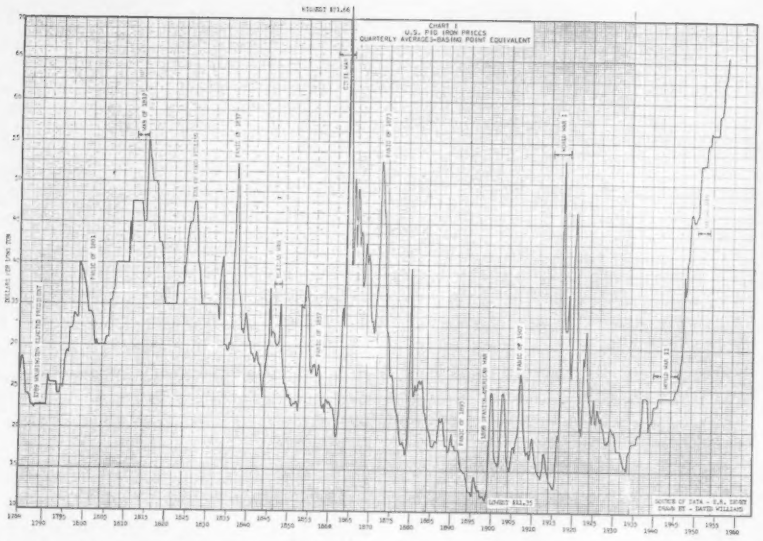


FIGURE B ANNUAL ADDITIONS TO WORLD MONETARY STOCKS OF GOLD IN PER CENT OF EXISTING STOCKS AND WHOLESALE PRICES OF THIRTY BASIC COMMODITIES IN GOLD, THIRTEEN YEARS LATER, UNITED STATES, 1860-1956
Additions are five-year averages centered on the fifth year
Commodity prices are annual, thirteen years later



principal use is in the electrical and allied industries—for transmission lines, other forms of conductors, and machinery, which account for over 50% of total annual consumption. The automobile and building construction industries are the second and third largest peacetime consumers of copper in the U. S.

★ ★ ★

Altho copper comprises only 0.01% of the earth's crust its use antedates history. From time immemorial, it has been the key metal to civilization and culture. A copper button that was proudly worn by a Pharaoh of 4400 B. C. has been found in an Egyptian tomb. A length of copper tubing, which had been used to carry water across the desert 55 centuries ago, was discovered near the Great Pyramid of Cheops by archaeologists in 1940. In the New World, copper was used by the Indians for centuries before the arrival of the white man. But it wasn't until 1844 that large scale development of the rich native deposits of the Lake Superior region was begun. That year also marked the birth of the electrical industry, for it was on May 24, 1844 that **Samuel F. B. Morse** tapped out over a copper wire the first telegraphic message between Washington and Baltimore, "What hath God wrought!" Total U. S. copper production in 1844 was about 100 tons and in the rest of the world approximately 32,600 tons.

★ ★ ★

The subsequent inventions in 1875 of the telephone by Bell, and the Electric Arc Light by Brush, Weston, et al, and in 1879 of the Electric Incandescent Light by Edison, gave an enormous stimulus to the production and utilization of copper. Coincident with the opening of Edison's historic Pearl St. Station in September, 1882, came the discovery of Anaconda's fabulously rich vein mine in Butte, Montana, to be followed in 1885 by large scale development of the Phelps Dodge mines in Arizona, and in 1905 of the Kennecott open pit porphyry copper mines in Utah and Nevada. Equally vast copper producing properties were opened up in Chile, Peru, Canada, Alaska, the Belgian Congo and South Africa. World production rose from 32,600 tons in 1844 to 3,750,000 tons in 1956. In the 100 years since Morse's telegraph ushered in the Electrical Age, U. S. mines alone have produced over 41,000,000 tons of copper.

★ ★ ★

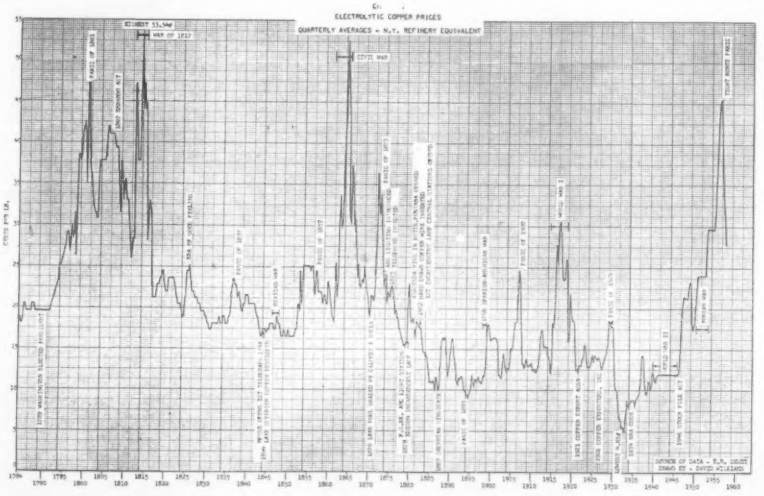
The price of copper since 1784, as shown by quarterly averages in Chart II, has ranged from an all time peak of 53.54¢ during the War of 1812 to an all time low of 4.85¢ in 1933. A second peak of 52.52¢ occurred during the Civil War, a third peak of 30.64¢ during World War I, and another of 45.58¢ in the 2nd quarter of 1956. It has since declined to 20.06¢ (L.M.E.) in February, 1958. The American Producers price which went up to 46¢ in 1956, has since fallen to 25¢.

★ ★ ★

Attempts to control the price of, or to corner the output of copper, have not been uniformly successful. The first such attempt on record is that of the Lake Pool of 1870, headed by Calumet & Hecla, resulting in a rise from 18.91¢ in the 2nd quarter of 1870 to 36.36¢ in the 2nd quarter of 1872, after which a long decline set in until 1887.

★ ★ ★

Next came the French Secretan Syndicate, which in 1887 attempted to corner the world's supply of copper. (Copper had declined to 9.00¢ in the 2nd quarter of 1887.) Contracts were made with the principal copper mines of the



world whereby they agreed to limit production in consideration of the Syndicate's contract to buy their total output. 160,000 tons were accumulated at an average cost of $350.00 per ton, but when the price was advanced to $400. per ton, consumption was discouraged, and extensive use of scrap copper together with increased production by mines not in the agreement, caused a collapse in the price of copper in the Spring of 1889, bankrupted the Syndicate and led to the suicide of the president of the Syndicate's bank. (The high during the 1st quarter of 1889 was 16.46¢ and prices fell to 9.18¢ during the 3rd quarter of 1894.)

★ ★ ★

In 1897 when copper was selling at about 11¢ per lb., **Thomas William Lawson** of Boston, Mass., and **Henry H. Rogers** of New York conceived the idea of controlling the price of copper. The first step was the formation of the Amalgamated Copper Company of New Jersey in May, 1899, and its purchase of **Marcus Daly's** Anaconda Copper Mining Company. But attempts to purchase the rest of the Montana mines and the Michigan mines were unsuccessful. Despite the strong market that had prevailed since the end of the Spanish-American War, the efforts of the syndicate to push prices higher were not very successful, as Lake copper only rose from 18¼¢ in May 1899 to 18½¢ in August 1899, from which point prices declined to 11.39¢ in the 4th quarter of 1902. Amalgamated's agent in the British market was the United Metals Selling Company, formed by Lewisohn Brothers, at that time the leading copper sales organization in the world.

★ ★ ★

During World War I, the price of copper shot up to 37¢ per lb. before **Bernard M. Baruch,** on behalf of the U. S. Government negotiated with the American Copper producers for a price freeze of 23¢ for copper sold to the Armed Services. The Post-War collapse brought copper prices down to a 1921 low of 11½¢, and U. S. smelter production down from a high of 954,000 tons in 1918 to a low of 253,000 tons in 1921. The Copper Export Association was then formed in an effort to stimulate foreign sales of copper, with some success, prices rising from 11.92¢ in the 3rd quarter of 1921 to 15.59¢ in the 2nd quarter of 1923. It was succeeded in 1926 by Copper Exporters, Inc., which was a little more successful, prices rising from 12.6¢ in the 2nd quarter of 1927 to 18.53¢ in the 1st quarter of 1929.

★ ★ ★

The Panic of 1929 forced prices down from a high of 24¢ to an all-time low of 5¢, delivered Conn. Valley. A slow rise occurred to 9¢, the N.R.A. "Blue Eagle" price in effect between April 26, 1934 and May 27, 1935 inclusive. During World War II, the price was frozen at 12¢ by the Government from March 28, 1941 to June 3, 1946. Upon removal of price controls and stimulated by the inflationary effect of the Stock Pile Act of 1946, the price shot up to 23½¢ in August 1948, and then declined to 16¢ in June 1949. Following the outbreak of the Korean War, the Government froze the price at 24½¢ for Domestic copper on January 26, 1951 and at 27½¢ for Foreign copper sold in the U. S. on July 25, 1951. Prices were decontrolled on February 13, 1953, and Domestic prices ranged from 27½¢ to 34½¢ until the end of April when they stabilized in the 29½ to 30¢ range. During this same period, uncontrolled Foreign copper sold as high as 36½¢ per lb.

★ ★ ★

The Chilean Government policy of maintaining the price of copper more than 6¢ per lb. above the U. S. level led to a large accumulation of unsold metal, which by August 1953 amounted to 180,000 tons. Chile thereupon negotiated the sale of 100,000 tons to the U. S. stockpile in March 1954 at the prevailing U. S. market price of 30¢. This action effectively removed the threat of lower prices, and the U. S. producers' price rose steadily to a peak of 46¢ on February 20, 1956. Copper on the London Metal Exchange reached a peak of 55¢ per lb.

★ ★ ★

Before World War II, the U. S. was a net exporter of copper, producing almost 2/3 of he world's copper in the ten years ending with 1920. The enormous war time demands made it necessary to import additional copper supplies. Following the end of the War, the drop in military consumption of copper was offset by increased peace-time uses, which necessitated a continuance of our dependence on foreign imports, chiefly from Chile. In the ten years ending with 1956, U. S. Smelter production from Domestic ores was 9,134,000 tons, or less than 1/3 of total World production of 29,554,000 tons. Efforts are now being made to reimpose the excise tax which was suspended from April 30, 1947 to June 30, 1958 (unless the average price for a calendar month drops below 24¢ when the tax automatically becomes effective). The tax, which was originally 4¢, was reduced to 2¢ on March 31, 1949, has since been reduced to 1.9¢ 1.8¢, and 1.7¢ for the fiscal years 1957, 1958, and 1959 respectively, should the tariff be reimposed.

★ ★ ★

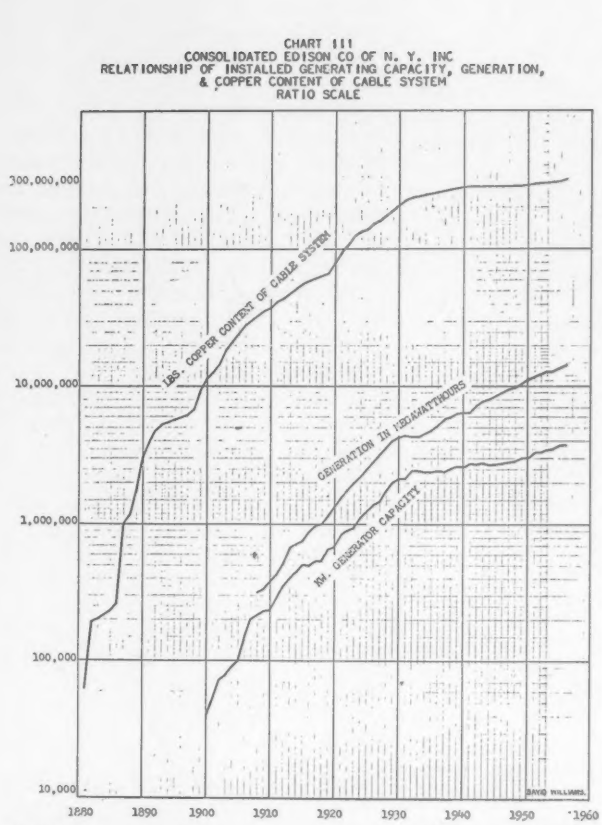
The price of copper has fallen from 46¢ to 25¢ (Producers) and from 55¢ to 26.06¢ (L.M.E.). The immediate cause of this drastic decline is of course overproduction, coupled with the effects of the Federal Reserve tight money policy.

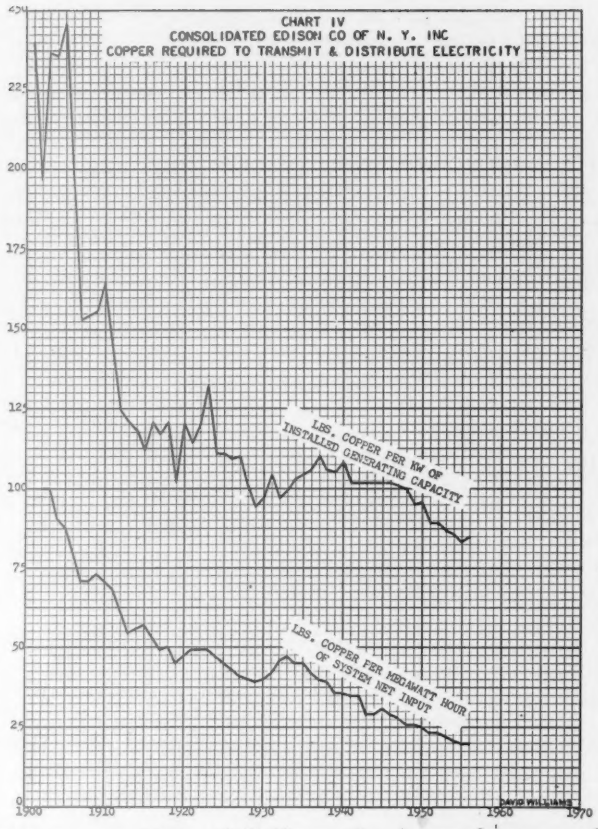
★ ★ ★

It is, however, significant that the cyclic researches of Dewey indicated a peak during the 1st quarter of 1956 to be followed by a decline to the 4th quarter of 1960. This decline in copper prices confirms the studies of **Professors Gans, Myers** and **Pearson,** previously discussed in connection with iron and steel prices.

★ ★ ★

In attempting to forecast the demand for copper for use in electric cable, care should be taken to give proper consideration to the declining trend in the amount of copper required to transmit and





distribute electrical energy, as shown in the attached Charts III and IV. These charts are based on the growth of the Consolidated Edison Co. of N. Y. Inc., which serves a population of almost nine million people living in an area of slightly less than 600 miles. Chart IV shows that the amount of copper required to transmit and distribute electrical energy in the Con Edison System has fallen from 281 lbs. per KW of installed generator capacity in 1900 to 85 lbs. per KW at the end of 1956. Because of better Load Factor, the amount of copper has fallen from 100 lbs. per Megawatthour in 1902 to only 20 lbs. in 1955 and 1956.

★ ★ ★

That this trend is not confined to the Con Edison System is indicated by the following statement of **Watson Davis** in "The Story of Copper" (1924). "An electrical journal estimates that during the next decade in eleven Western States electrical plants will be constructed with a capacity of 2,800,000 horsepower requiring 280,000,000 pounds of copper." This is at the rate of 100 lbs. of copper per HP, or 134 lbs. per KW of installed generator capacity. The corresponding figure for the Con Edison System was 132 lbs. per KW in 1923.

★ ★ ★

This remarkable decline in copper requirements is due to the tremendous technological improvements, which have increased the transmission voltage from the 120 volts of Edison's original Pearl St. Station in 1882 to the currently used 138,000 volts. On other utility systems transmission voltages have increasd to 220,000, and research is under way on 345,000 volt lines. While utilization voltages are still largely 120/208V., some installations have been made at 265/460V. beginning in 1954. Though the trend toward still higher transmission voltages will require less copper per unit of electrical energy transmitted, the future growth of the Public Utility Industry will require larger amounts of copper, but the rate of copper consumption will be less than in the past. For other utility systems with large overhead installations, the increasing use of aluminum will further reduce the amount of copper that will have to be added to their plant in the future.

★ ★ ★

A somewhat similar trend is noted in the Communications Industry. The Bell System had approximately 700,000,000 lbs. of copper and 10,202,000 telephones in 1923. In 1956, the copper increased 250% to 2,443,000,000 lbs., but the number of telephones increased 385% to 49,438,000. Technological improvements in the art of electric communication have been of equal or even greater scope than in the electric power industry.

Aluminum

Of all the major metals, aluminum is the only one whose rate of consumption during the past decade has increased faster than the expanding industrial production of the United States. The increase in primary production of aluminum between 1939 and 1955 was

857%, or 6 times that of all industrial production as measured by the Federal Reserve index, 7 times the percentage rise of steel production, and 27 times that of copper production. U. S. consumption of aluminum rose from 3 pounds per capita in 1939 to 24 pounds per capita by 1956. The U. S. is the world's largest producer as well as consumer of aluminum, having held this position since 1888, except for a few years before World War II.

★ ★ ★

Altho miiltary uses accounted for 90% of total U. S. consumption during World War II, in 1956 the distribution by industries was as follows: Transportation (including military and civilian aircraft, automobiles, t r u c k s, ships) — 24%; Building Products — 23%. Consumer Durable Goods (such as, household appliances, cooking utensils, furniture, etc.)— 13%; Commercial and Industrial Machinery and Equipment (except electrical) — 10%; Electrical Conductors, machinery and equipment and communications — 9%; Containers and Packaging — 4 %; Miscellaneous ordnance, metallurgical and other uses account for the balance — 17%.

★ ★ ★

While aluminum is the most abundant metallic element in the earth, forming 8% of the solid portion of the earth's crust to a depth of 10 miles, its use only dates back 100 years. In 1807, the English scientist **Sir Humphrey Davy** attempted (unsuccessfully) to reduce alumina by heating it with potash and electrolyzing the mixture. The honor of producing the first aluminum goes to the Danish physicist and chemist **Hans Christian Oersted,** who announced his achievement to the Royal Danish Academy of Sciences at Copenhagen in 1825. By gently heating potassium amalgam with aluminum chloride and distilling the mercury from the resultant aluminum amalgam, he obtained a small lump of aluminum metal. The German scientist **Frederick Woehler,** in 1845, succeeded in producing a few milligrams of aluminum by using potassium in place of the amalgam.

★ ★ ★

The founder of the chemical aluminum industry was the French Chemist **Henri Saint-Claire Deville,** who was commissioned by Emperor Napoleon III to develop a method of making aluminum cheaply and in large quantities. In 1854, Deville announced to the French Academy of Sciences that he had produced aluminum by using sodium instead of potassium, at a cost of $17 an ounce ($272 a pound). Aluminum up to then was selling for more than $500. a pound. (Deville also produced aluminum electrolytically in 1854, but his source of energy was the battery, which made the method too expensive.)

★ ★ ★

Aluminum bars were first exhibited by Deville at the Paris Exposition in 1855 and by Dick and Smith on March 30, 1855 at the Royal Institution, London, England. In 1856, Deville began the commercial production of aluminum at Glacier, a suburb of Paris. Prices were: 1856 100 francs per kilo ($90 per lb.), 1857 300 francs per kilo ($27 per lb.) and 1859 200 francs per kilo ($17 per lb.). Total French production of aluminum in 1857 was only 60 pounds, and total world production in 1859 was only 4,000 pounds (2 tons). In 1886, total world production was 17.6 tons, and in 1956 world production of aluminum reached 3,612,000 tons.

★ ★ ★

On June 1, 1886 **Hamilton Y. Castner** of New York invented a cheaper method of producing sodium, and the Castner-Deville process of aluminum production was first practically applied by the Aluminum Company, Ltd. at Oldbury, England, in 1888 at the rate of 500 lbs. per day, the product selling for 16 shillings ($3.89) per lb. In the three years of its operation from July 1888, this plant produced a total of 250,000 lbs. of aluminum, the price of which was finally reduced to 15 shillings per pound.

★ ★ ★

On February 23, 1886, **Charles Martin Hall** of Oberlin, Ohio, produced aluminum by electrolyzing a solution of alumina in molten cryolite. (The first electrolytically refined copper in the U. S. was only produced around 1880, by **James Douglas** at Phoenixville, Pa., using **Edward Weston's** electroplating dynamoes.) The Pittsburgh Reduction Company was organized September 18, 1888 and started commercial production of aluminum by Hall's method in Pittsburgh, Pa. November 1888, at the rate of 50 pounds per day. Production was increased September 1890 to 475 lbs. per day, 1893 to 1000 lbs. per day, and 1894 to 2000 pounds per day. Prices dropped from $8.00 per lb. in 1888 to $5.00 in January 1889, then to $4.00, and finally to $2.00 by the year end, and to $1.00 per lb. in 1890. These successive price reductions forced the closing of the last of the sodium process plants by 1891

★ ★ ★

In Europe, **Paul L. T. Heroult** of Paris, had independently of Hall developed a similar process, for which he was granted a patent on April 23, 1886. Plants using Heroult's process were built in Switzerland and France in 1888 and in England in 1894. The Hall-Heroult process forms the basis for the present day production of aluminum thruout the world.

★ ★ ★

In April 1891, the U. S. Court fixed the price at $1.50 per lb., but in August 1891 the Court fixed the minimum U. S. price at 50¢ per lb., because the European price had fallen to almost 50¢ per lb. In May 1892, the Court raised the price to 65¢. Increased production and lower costs brought on a price decline which continued to the outbreak of the Spanish-American War in 1898 when the price stabilized for several years at 34¢ per lb. Prices rose briefly to 40¢ in 1907, declined to 18¢ in 1914, and shot up to 64¼¢ during World War I. In the Post-War period prices collapsed to 17¢ in 1922, rose to 27½¢ in 1924 and then declined to 15¢ in 1941 at which level they were frozen by the

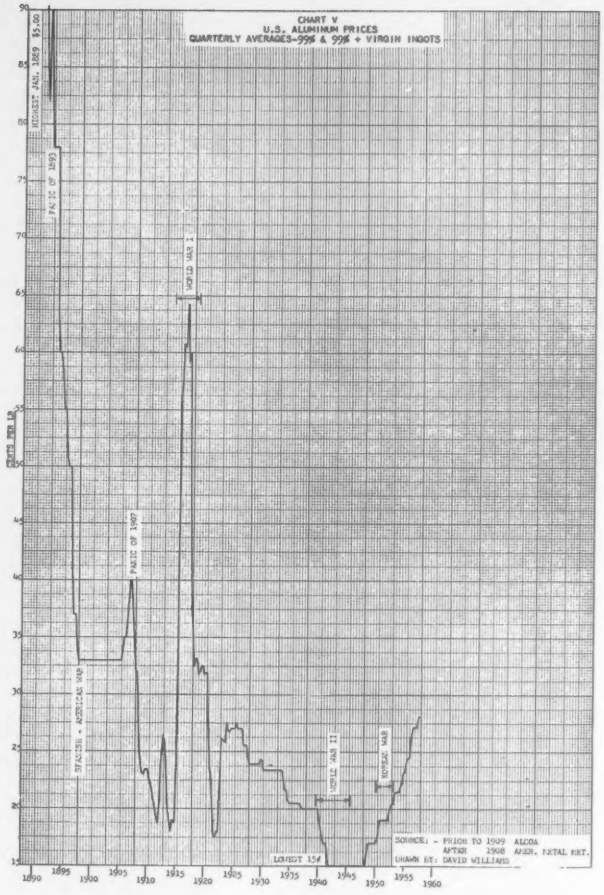
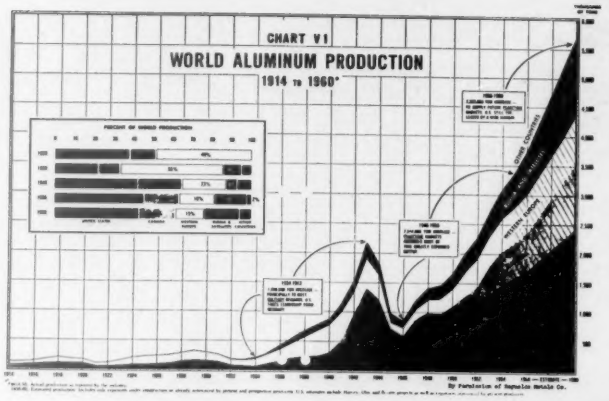


CHART V
U.S. ALUMINUM PRICES
QUARTERLY AVERAGES—99% & 99% + VIRGIN INGOTS
HIGHEST JAN. 1859 $5.00
PANIC OF 1893
WORLD WAR I
PANIC OF 1907
STARTED - AMERICAN MAN
WORLD WAR II
KOREAN WAR
LOWEST 15¢
SOURCE: - PRIOR TO 1909 ALCOA
AFTER 1908 AMER. METAL MKT.
DRAWN BY: DAVID WILLIAMS
CENTS PER LB.
1890 1895 1900 1905 1910 1915 1920 1925 1930 1935 1940 1945 1950 1955 1960



Government for the duration of World War II. Since the end of World War II, the price has gradually risen to 28.1¢ per lb.

★ ★ ★

On January 1, 1907, The Pittsburgh Reduction Company changed its name to Aluminum Company of America and under that name was the sole producer of primary aluminum in the United States until the advent of Reynolds Metals Company in 1941. That company brought in a plant at Lister Hill (near Sheffield, Ala.) and one at Longview, Washington. Permanente Metals — now known as Kaiser Aluminum entered the field in 1946 thru the leasing of the Government Reduction Plant at Meade, Wash. Anaconda started producing aluminum in 1952. As of January 1, 1957, the primary ingot capacity of these companies was as follows:

Alcoa	**792,500 tons**
Reynolds	**488,500 tons**
Kaiser	**434,500 tons**
Anaconda	**60,000 tons**
Total	**1,775,500 tons**

★ ★ ★

In addition to the foregoing companies, Harvey and Olin Revere are soon to enter the field. Enlargement of productive capacity, now under way or planned, shown on Chart VI thru the courtesy of Reynolds Metals Company may bring on a condition of over-capacity. This will result in a weakening price structure. Such price weakness has already occurred in the foreign market, which is also faced with growing over-capacity. However, the amazing growth of the Aluminum industry and its ability to develop new markets, give promise that any over-capacity will be of relatively short duration.

★ ★ ★

Altho aluminum has a conductivity of about 61-63% of that of copper, it only weighs 30% as much as copper. Hence it has found an important application as an electrical conductor. Its first use as such was in a bus bar line at the Niagara Falls plant of The Pittsburgh Reduction Company in 1895. The first aluminum Transmission line was a half-mile of No. 11 gage telephone wire erected in the Chicago Stock Yards in April 1897. The first important power transmission installation was the 46 mile, 3 phase line erected for the Standard Electric Company from Blue Lakes to Stockton, California in 1898, using a single strand wire alloyed with 2% copper. Breakages resulted in the development of a 7 strand pure aluminum cable, which was subsequently superseded by the A.C.S.R. design developed by **William Hoopes,** Chief Engineer of ALCOA in 1908.

★ ★ ★

In the A.C.S.R. design, the core, which acts as a catenary support, consists of galvanized or aluminized steel, around which are stranded the aluminum wires. This design was used in the U.S. for almost 10 years before its adoption in Europe, which had continued to use copper since the first overhead transmission line was built between Lauffen and Frankfort, Germany in 1890. Today, A.C.S.R. has captured almost 100% of the overhead transmission lines in the U.S., which has over 3,000,000 conductor miles in operation. Aluminum conductors are also used extensively for overhead line wire and service drop cable. While aluminum has been used exten-

(*Please turn to page* 342)

ELGIN DIAMOND

meets rigid quality standards

at Allegheny Ludlum Steel Corporation, Pittsburgh

When wire is pulled through carbide dies, tremendous heat and pressure are generated. That is why the working surfaces of wire drawing dies must be polished to a near perfect finish. That is why Allegheny Ludlum uses Elgin Diamond.

Elgin Diamond assures the finest possible finish—and in less time—because all Elgin Diamond is precision graded and permanently suspended in a color-identified compound right in the Elgin laboratories. There are no oversize particles to scratch, no "fines" to decrease cutting efficiency.

Hundreds of die finishing applications prove Elgin Diamond reduces costs and produces a better finish every time . . . in less time! Now is the time to try Elgin Diamond and prove it to yourself!

Ask for a free demonstration!

ABRASIVES DIVISION

ELGIN NATIONAL WATCH COMPANY

Dept. G

ELGIN, ILLINOIS

Techniques for Insulating Wire and Cable with Silicone Rubber

by D. C. Youngs, D. J. Badamo and M. N. Culver
Dow Corning Corporation
Midland, Michigan

The authors discuss the results of studies on the extrusion of silicone rubber and techniques used in insulating electrical conductors with tapes of the same material.

The paper was presented at the 6th Annual Wire and Cable Symposium of the Signal Corps at Asbury Park, N. J., on December 5, 1957.

Silicone rubber is recognized as an excellent dielectric material and is being used more and more for wire insulation. Its resistance to heat and chemical attack, and its excellent retention of dielectric properties from —130 F to over 500 F, make it useful for applications where no other rubber can be considered. The increasing demand for wire and cable insulated with silicone rubber has resulted in great interest in improved manufacturing methods.

Feeding the Extruder

Hand feeding is the most common method of feeding silicone rubber into the extruder. Accordingly, our study began with an effort to find a mechanical feed which would reduce the amount of labor required to extrude silicone rubber.

★ ★ ★

The roller feed, which is available from at least two extruder manufacturers, works very well as a feeding aid. Figure 1 is a picture of a roller feed on a 2½ inch extruder. The roller is part of the feed box and is constructed so it rotates close to the screw, in the opposite direction. The roller is driven through a friction clutch, which can be adjusted so the roller will stop when the feed box is full of stock.

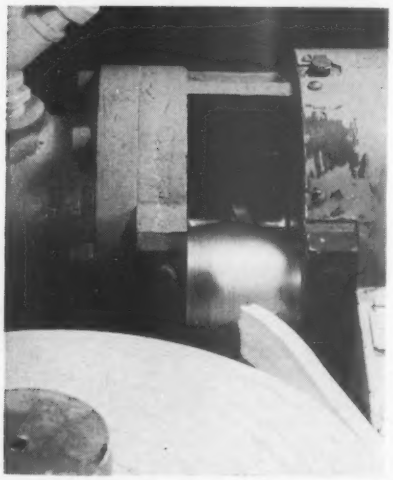


Fig. 1—Closeup view of roller feed for the extruder. A hat wound with silicone rubber is in the foreground. * * * * * *

★ ★ ★

With the roller feed it is possible to feed silicone rubber to the extruder in much the same way that organic rubbers are handled. The stock is cut, formed into a strip, and wound on a hat (Fig. 1 and Fig. 2).

★ ★ ★

The roller feed takes the strips directly from the hat. Feeding with this arrangement becomes semi-automatic; the machine operator has time for other work while the extruder is running.

★ ★ ★

Figure No. 2 is a picture of a hat being used to feed the extruder. You will note that the hat is mounted in a horizontal position. A vertical mounting was tried, but it was found that some silicone rubber stocks tend to sag away from the hat due to their rather low green strength.

★ ★ ★

The hat should be mounted so that the roller readily pulls the stock into the screw.

★ ★ ★

As the silicone rubber is stripped from the mill it should be dusted lightly with Neo Novacite* when making the hat.

Screw Design

It is important to have a screw of the correct design, especially when insulating wire. Some screws work well with a soft silicone rubber but not so well with a dry stiff stock. Other screws do well when making large extrusions, but will not build up enough pressure when making thin wall extrusions.

★ ★ ★

A great deal of work has been done† to determine the extruding

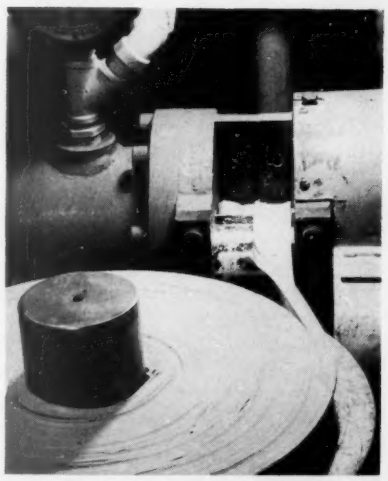


Fig. 2—Roller feed takes raw silicone rubber strip from hat and feeds it into extruder. Feed roll is powered by a friction drive and automatically stops if feed box becomes overfull.

* Malvern Mineral Products, Hot Springs, Arkansas.

† We appreciate the cooperation of the following companies in loaning, modifying and testing equipment used in obtaining much of the data for this paper: Davis-Standard Sales Corporation, Division of Franklin Research Corp., Mystic, Conn., National Rubber Machinery Co., Akron, Ohio, John Royle & Sons, Paterson, New Jersey.

characteristics of different types of screws under various conditions with different stocks. To evaluate the performance of different screws the following factors were studied:

1. **The quantity of output.**
2. **The variation of output.**
3. **The efficiency of the screw.**
4. **The temperature build-up of the stock in the extruder.**

Screws

To evaluate these factors, we used the following screws:

Screw No. 1 — A double flight screw of standard length, decreasing pitch, and a compression ratio of 1.75:1.

Screw No. 2 — Almost the same as No. 1 except that one flight has been removed so as to make a single flight screw.

Screw No. 3 — A single flight screw of standard length, decreasing pitch, with a compression ratio of 3.10:1. The root diameter of this screw is reduced at the feed box.

Screw No. 4 — Similar in design to No. 3 except this screw is an extended type with a compression ratio of 4.8:1.

Screw No. 5 — A double flight screw of extended length, constant pitch, increasing root diameter, with a compression ratio of 1.78:1.

Screw No. 6 — Similar to No. 4; a single flight extended length, decreasing pitch screw with a compression ratio of 2.35:1. The root diameter of this screw is reduced at the feed box.

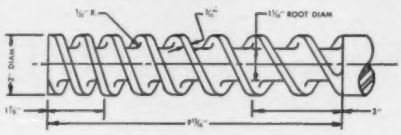
Screws 1, 2, 3 and 4 were hand fed and screws 5 and 6 were roller fed.

Procedure

To evaluate the screws, three silicone rubber stocks were used.

EXTRUDER SCREW No. 1

2" DOUBLE FLIGHT, STANDARD LENGTH, 5 32" LEAD RADIUS
L/D — 4.9:1 COMPRESSION RATIO — 1.75:1



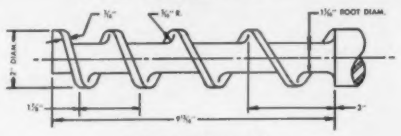
SCREW PERFORMANCE

	Stock	.063" Die		.500" Die	
		25 RPM	50 RPM	25 RPM	50 RPM
ACTUAL OUTPUT IN POUNDS PER HOUR	Silastic 30	2.0	2.9	30	60
	Silastic 80	1.6	2.1	31	59
	Silastic S-2070	2.3	4.2	13	30
VARIATION OF OUTPUT IN PERCENT OF MAXIMUM	Silastic 30	13	10	6	3.8
	Silastic 80	12	12	3.4	10
	Silastic S-2070	10	11	8	13
EFFICIENCY OF OUTPUT IN PERCENT OF THEORETICAL	Silastic 30	0.9	0.7	16	14
	Silastic 80	0.7	0.5	14	12
	Silastic S-2070	1.0	0.8	5	4.8

	Stock	Rise in 20 Minutes
TEMPERATURE BUILD-UP	Silastic 80	82° F

EXTRUDER SCREW No. 2

2" SINGLE FLIGHT, STANDARD LENGTH, 5 32" LEAD RADIUS
L/D — 4.9:1 COMPRESSION RATIO — 1.67:1



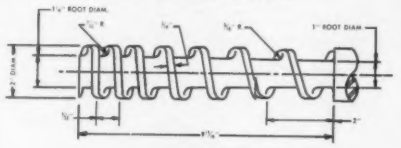
SCREW PERFORMANCE

	Stock	.063" Die		.500" Die	
		25 RPM	50 RPM	25 RPM	50 RPM
ACTUAL OUTPUT IN POUNDS PER HOUR	Silastic 30	0.72	1.6	28	70
	Silastic 80	0.6	0.8	26	60
	Silastic S-2070	0.9	1.6	12	31
VARIATION OF OUTPUT IN PERCENT OF MAXIMUM	Silastic 30	13	10	11	8
	Silastic 80	17	23	9	4
	Silastic S-2070	11	19	12	13
EFFICIENCY OF OUTPUT IN PERCENT OF THEORETICAL	Silastic 30	0.3	0.3	16	16
	Silastic 80	0.2	0.2	10	14
	Silastic S-2070	0.3	0.3	4.3	3.6

	Stock	Rise in 20 Minutes
TEMPERATURE BUILD-UP	Silastic 80	47.4° F

EXTRUDER SCREW No. 3

2" SINGLE FLIGHT, STANDARD LENGTH, 7 32" LEAD RADIUS
L/D — 4.9:1 COMPRESSION RATIO — 3.10:1



SCREW PERFORMANCE

	Stock	.063" Die		.500" Die	
		25 RPM	50 RPM	25 RPM	50 RPM
ACTUAL OUTPUT IN POUNDS PER HOUR	Silastic 30	12	21	39	70
	Silastic 80	9	16	35	63
	Silastic S-2070	7	10	16	27
VARIATION OF OUTPUT IN PERCENT OF MAXIMUM	Silastic 30	5	7	13	8
	Silastic 80	15	18	6	7
	Silastic S-2070	6	15	12	9
EFFICIENCY OF OUTPUT IN PERCENT OF THEORETICAL	Silastic 30	14	12	41	42
	Silastic 80	10	9	41	37
	Silastic S-2070	6	5	16	13

	Stock	Rise in 20 Minutes
TEMPERATURE BUILD-UP	Silastic 80	43.6° F

Each stock was run using 25 rpm and 50 rpm screw speeds. Also, with each screw speed, a .063 inch and a .500 inch diameter die were used. The actual output of each screw was determined in pounds of stock per hour. To determine the efficiency of the screws the actual output was divided by the theoretical output and multiplied by 100 to give percent efficiency. The theoretical capacity was determined by calculating the volume of the last flight of the screw at the discharge end and multiplying this by the screw rpm. A typical example: 42 pounds per hour actual output, divided by 69 pounds per hour theoretical capacity, times 100 equals 61 percent efficiency.

$$\frac{42}{69} = .61 \times 100 = 61\%$$

★ ★ ★

The variation in output was determined by obtaining the weight of stock at 15 second consecutive intervals, then determining the difference between the maximum and minimum weights. Percent variation is calculated as this difference divided by the maximum output, times 100. A typical example: 63.5 grams minimum output subtracted from 68 grams maximum output equals 4.5 grams. Then—

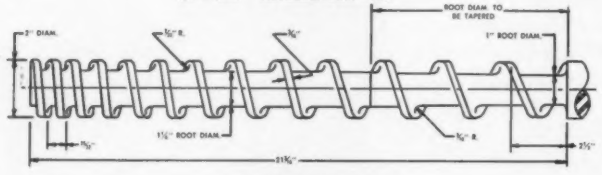
$$\frac{4.5}{68} = .066 \times 100 = 6.6\% \text{ variation}$$

★ ★ ★

Tests were run to determine the temperature rise of the stock when operating the various screws (without cooling) at a definite speed and time. The temperature build-up was measured with thermocouples inserted so that the temperature of the stock was obtained close to the breaker

EXTRUDER SCREW No. 4

2" SINGLE FLIGHT, EXTENDED LENGTH
L/D — 10.5:1 COMPRESSION RATIO — 4.8:1



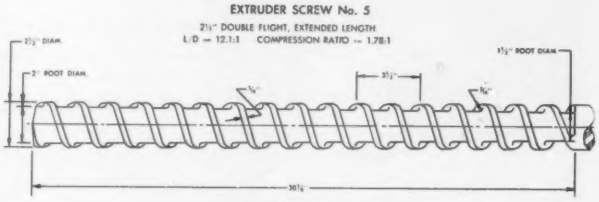
SCREW PERFORMANCE

	Stock	.063" Die		.500" Die	
		25 RPM	50 RPM	25 RPM	50 RPM
ACTUAL OUTPUT IN POUNDS PER HOUR	Silastic 30	36	48	38	83
	Silastic 80	33	46	36	98
	Silastic S-2070	38	61	44	93
VARIATION OF OUTPUT IN PERCENT OF MAXIMUM	Silastic 30	8	9	8	3
	Silastic 80	6	7	10	8
	Silastic S-2070	8	9	9	6
EFFICIENCY OF OUTPUT IN PERCENT OF THEORETICAL	Silastic 30	47	41	64	70
	Silastic 80	40	39	61	77
	Silastic S-2070	49	38	63	67

	Stock	Rise in 20 Minutes
TEMPERATURE BUILD-UP	Silastic 80	78° F

EXTRUDER SCREW No. 5

2½" DOUBLE FLIGHT, EXTENDED LENGTH
L/D — 12.1:1 COMPRESSION RATIO — 1.78:1



SCREW PERFORMANCE

	Stock	.063" Die		.500" Die	
		25 RPM	50 RPM	25 RPM	50 RPM
ACTUAL OUTPUT IN POUNDS PER HOUR	Silastic 50	60	111	117	220
	Silastic 80	46	88	109	224
	Silastic S 2070	22	36	89	130
VARIATION OF OUTPUT IN PERCENT OF MAXIMUM	Silastic 50	9	3.5	3.7	3.9
	Silastic 80	6	9.2	5	3.6
	Silastic S 2070	13	9	5	3.2
EFFICIENCY OF OUTPUT IN PERCENT OF THEORETICAL	Silastic 50	10	17	36	34
	Silastic 80	14	13	33	34
	Silastic S 2070	6	10	15	17

	Stock	Rise in 20 Minutes
TEMPERATURE BUILD-UP	Silastic 80	78° F

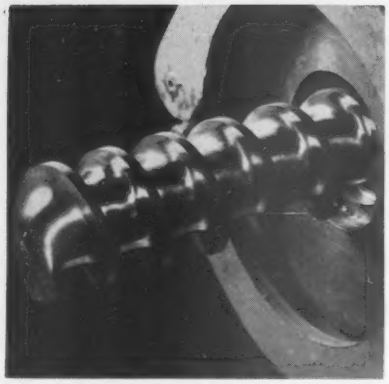
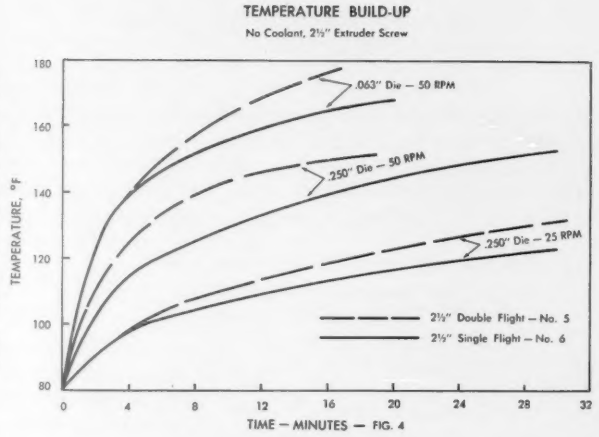
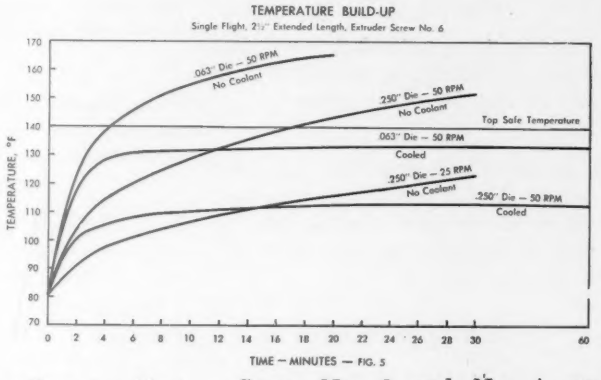


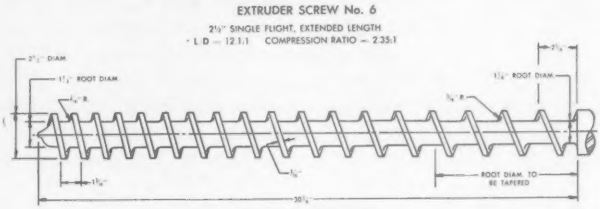
Fig. 3—Discharge end of the No. 6 single flight screw. End of screw is so designed that no dead stock remains at the end of the screw. * *

Fig. 4—Graph illustrating heat build-up in silicone rubber being extruded through 2 different dies at 2 different speeds. Curves are given for a double flight extended and a single flight extended screw. No coolant is being used.

Fig. 5—Graph illustrating heat build-up with No. 6 single flight extended screw. Two die sizes were used at 2 different screw speeds. The 2 sets of curves illustrate the effect of a coolant. * * * *


TEMPERATURE BUILD-UP
No Coolant, 2½" Extruder Screw
.063" Die — 50 RPM
.250" Die — 50 RPM
.250" Die — 25 RPM
2½" Double Flight — No. 5
2½" Single Flight — No. 6
TEMPERATURE, °F
TIME — MINUTES — FIG. 4


TEMPERATURE BUILD-UP
Single Flight, 2½" Extended Length, Extruder Screw No. 6
.063" Die — 50 RPM No Coolant
.250" Die — 50 RPM No Coolant
Top Safe Temperature
.063" Die — 50 RPM Cooled
.250" Die — 25 RPM No Coolant
.250" Die — 50 RPM Cooled
TEMPERATURE, °F
TIME — MINUTES — FIG. 5



SCREW PERFORMANCE

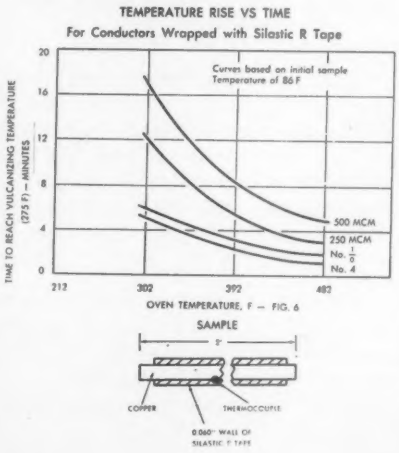
	Stock	.063" Die 25 RPM	.063" Die 50 RPM	.500" Die 25 RPM	.500" Die 50 RPM
ACTUAL OUTPUT IN POUNDS PER HOUR	Silastic 50	71.4	130	119.3	228.5
	Silastic 80	62.3	112.8	127	224
	Silastic S-2070	65.4	117.9	98.6	184.5
VARIATION OF OUTPUT IN PERCENT OF MAXIMUM	Silastic 50	4.1	5.0	4.6	7.4
	Silastic 80	5.06	1.4	5.5	2.8
	Silastic S-2070	8.6	8.5	8.1*	6.9
EFFICIENCY OF OUTPUT IN PERCENT OF THEORETICAL	Silastic 50	39	36	66	63
	Silastic 80	34	31	69	61
	Silastic S-2070	35	32	45	42

	Stock	Rise in 20 Minutes
TEMPERATURE BUILD-UP	Silastic 80	70.8° F

plate on the discharge side. Silastic 80 was used for these tests. It was extruded through a ¼ inch die.

★ ★ ★

Before starting the run the extruder was cooled to about 65 F. The screw was operated at 50 rpm. The stock temperature was recorded each minute for the first 10 minutes, then for each 5 minutes for the next 20 minutes. An eighty mesh screen was used in front of the breaker plate for all of the tests.


TEMPERATURE RISE VS TIME
For Conductors Wrapped with Silastic R Tape
Curves based on initial sample Temperature of 86 F
500 MCM
250 MCM
No. 1/0
No. 4
TIME TO REACH VULCANIZING TEMPERATURE (375 F) — MINUTES
OVEN TEMPERATURE, F — FIG. 6
SAMPLE
COPPER
THERMOCOUPLE
0.060" WALL OF SILASTIC R TAPE

Three different silicone rubber stocks—Silastic* 50, Silastic 80, and Silastic S-2070—were used in each of the tests except temperature build-up, where Silastic 80 was used. Silastic 50 has a durometer hardness of 40 as vulcanized (before oven curing). After an oven cure of 24 hours at 480 F, it has a durometer of 50. Silastic 80 has a durometer of 55 as vulcanized (before oven curing); after oven curing for 24 hours at 480 F, the durometer is 80. Silastic S-2070 has a durometer of 60, as vulcanized. The latter stock requires no milling before extruding.

★ ★ ★

On the previous page are diagrams of all the screws tested, together with data obtained in test runs with these screws.

★ ★ ★

In comparing these screws, note that Screw No. 1 and Screw No. 2 are about the same, except that No. 1 is a double flight screw and No. 2 is a single flight screw. Both have a relatively low compression ratio.

Screw No. 3 and No. 4 are similar except that No. 3 is standard length; No. 4 is extended length. Both have fairly high compression ratios.

★ ★ ★

Screws Nos. 5 and 6 differ in that No. 5 is a double flight screw, while No. 6 is a single flight screw. Both are extended length.

★ ★ ★

In examining the test data, the following facts stand out. They are listed under the various factors to which they apply.

Actual Output

1. When using a .063 inch die, higher output is obtained with screw No. 3 and No. 4 than with screws No. 1 and 2. Screws 3 and 4 have higher compression ratios than screws 1 and 2, which probably accounts for the difference in output.

★ ★ ★

2. When using the .063 inch die, No. 4 screw gives higher output than any of the first three screws. With the .500 inch die, however,

* T. M. Dow Corning Corporation

the difference in output among the four screws is much smaller.

★ ★ ★

3. When using a stiff stock such as Silastic S-2070, the No. 4 screw gave much higher output than any of the first three screws.

★ ★ ★

4. When comparing screws 5 and 6, it should be noted that, with a small die, the single flight screw (No. 6) had an actual output of 130 to 300 percent more than the double flight screw (No. 5).

Variation of Output

1. No. 4, an extended screw, has much less variation in output than any of the first four screws.

★ ★ ★

2. In comparing the extended screws, No. 5 and No. 6, note that screw 6, (single flight) gave a little less variation than screw No. 5 (double flight).

Efficiency of the Screw

1. No. 3 screw was much more efficient than screws No. 1 and No. 2.

★ ★ ★

2. No. 4 screw, in turn, was 50 to 100 percent more efficient than No. 3 screw.

★ ★ ★

3. Comparing the extended screws No. 5 and No. 6, note that the single flight screw (No. 6) was twice as efficient as the double flight screw when extruding Silastic 80 with a small die, and three to six times as efficient when extruding Silastic S-2070.

Temperature Build-Up

1. Although the extended screw, No. 4, developed more heat than any of the short screws, it also extruded at a faster rate. Therefore, it appears that if the screws were set to extrude at equal rates, the temperature rise among the first four might be nearly equal.

★ ★ ★

2. Little difference in temperature build-up was found among the short screws, even though the compression ratios were quite different.

★ ★ ★

3. Comparing screws 5 and 6, the temperature build-up was nearly 10 percent less with the single flight screw (No. 6), even though the compression ratio was about twice as high in the No. 6 screw.

Summary of Screw Design Studies

1. The output of an extended length screw is greater than that of a standard length screw when extruding silicone rubber. The difference is especially pronounced when using a small die.

★ ★ ★

2. An extended screw has less variation in output than a screw of standard length.

★ ★ ★

3. The compression ratio of the screw seems to be an important factor when greater pressures are required—as with a small die opening or a stiff stock.

★ ★ ★

4. The single flight screws, except No. 2, were much more efficient than the double flight screws.

★ ★ ★

5. A screw such as No. 4 or No. 6 seems to give the best all-around performance of any screw tested, for extruding silicone rubber. A compression ratio of between 2 and 3 to 1 seems to be best.

Use of Vacuum to Eliminate Blistering

Air is normally entrapped in stranded wire during extruding operations. If the insulation is hot air vulcanized, this trapped air will often expand enough to produce blisters between the wire and the extruded insulation.

★ ★ ★

This blistering can be eliminated by the use of a vacuum chamber attached to the wire-feed-in side of the extruder cross head. The vacuum chamber can be simply a pipe screwed onto the guider-tip holder at one end, and sealed on the other end with a silicone rubber stopper through which the wire can pass. The chamber is connected with a vacuum pump that will pull a 20 to 30 inch vacuum.

★ ★ ★

This set-up will do a very effective job of eliminating blistering due to air trapped within the strands of the cable.

Extruding Silicone Rubber Over Heated Wire

When using a steam-heated continuous vulcanizer, speeds comparable to those used in running organic rubber coated wire are possible. However, when using hot air continuous vulcanizers, the size and temperature of the conductors are important factors which affect the extrusion rates.

★ ★ ★

Table I indicates results of test runs involving preheated wire and an extruded silicone rubber covering. This work was done using our laboratory hot air vulcanizer, an eight-foot unit operating at 730 F.

TABLE I

Silastic	*Conductor Size*	*Insulation Thickness*	*Temperature of Preheating Oven*	*Feet Per Minute*	*Lbs. per Hr.*		*Vulcanization*
					Silastic	*Copper*	
81	12	.060″	77 F	16	14.4	19.8	Good
81	12	.060″	77 F	20	18.0	24.8	Soft
81	12	.060″	300 F	20	18.0	24.8	Good
81	8	.080″	77 F	10	19.5	30.5	Good
81	8	.080″	77 F	13	25.4	40.0	Soft
81	8	.080″	300 F	16	31.2	49.0	Good
80	8	.080″	480 F	24	46.5	73.5	Good

The conductors were preheated by placing the spools of wire in a hot air oven at the indicated temperature for about six hours.

★ ★ ★

The wire was then taken from the oven directly to the extruder. Of course, the actual temperature of the wire as it entered the extruder was somewhat less than the temperature of the preheating oven.

★ ★ ★

From these figures, it is evident that production of silicone rubber insulated wire can be speeded greatly by using preheated conductors with hot air vulcanizing units.

Semi-Vulcanized Silicone Rubber Tape

Large size conductors may sag too much in a long horizontal hot air vulcanizing unit for satisfactory production. Vertical hot air vulcanizing units, however, can be used with any size conductor which can be run through the extruder and covered satisfactorily. However, many wire and cable manufacturers have found it economical to insulate large cables using various kinds of tapes.

★ ★ ★

Semi-vulcanized silicone rubber tape has a promising future in the field of power cable insulations. This tape has been used for many years on the field coils of traction motors and has established itself as a rugged, dependable, electrical insulating material.

★ ★ ★

Although wires insulated with an extruded wall of silicone rubber are widely used in the electrical industry, a taped system is often desirable. This is mainly due to the need for increased abrasion resistance in large cables and because of the difficulty of processing, which limits the size of extruded insulation. Reinforced silicone rubber tapes have the advantage of mechanical toughness and flexibility while retaining the excellent dielectric properties and thermal characteristic of silicone rubber.

★ ★ ★

Silicone rubber tapes reinforced with a fibrous glass backing are commercially available in three states of cure: unvulcanized, semi-vulcanized, and fully vulcanized. The necessity of a slip sheet in rolls of unvulcanized silicone rubber tape limits its usefulness for cable taping since complicated methods must be developed to dispose of this interlayer during taping.

★ ★ ★

Although glass backed fully vulcanized silicone rubber tapes are presently used in the cable industry, semi-vulcanized silicone rubber tape is an improvement over many conventional systems using a fully vulcanized tape. The advantages of the semi-vulcanized silicone rubber tape system are due to the ability of this material to bond together to form a homogenous, void-free insulating jacket.

★ ★ ★

Cable insulation constructions employing fully cured silicone rubber tape also have limitations. Since this is an unbonded construction, sheaths or barrier tapes must be used to hold the insulating tapes in place. Also the integrity of the cables is dependent upon the sheath, which serves to prevent moisture and other contaminants from entering the cable.

★ ★ ★

Test work to date indicates that the best balance between handling characteristics and insulation properties are offered by the system utilizing semi-vulcanized silicone rubber tape.

★ ★ ★

This tape offers the cable engineer a fully bonded homogenous insulating system for power and control cables. It combines the excellent electrical properties and thermal stability of silicone rubber with the strength and abrasion resistance of glass cloth.

★ ★ ★

Semi-vulcanized silicone rubber tape is available commercially reinforced with several different types of glass cloth. A slip sheet is not required between the layers of semi-vulcanized silicone rubber tape. The tape can be easily applied with a conventional taping machine.

Methods of Vulcanizing

Good vulcanization can be obtained by passing the cable through a hot air vulcanizing unit or by placing the cable in an air circulating oven.

★ ★ ★

If the taped cable is to be cured in a steam autoclave it should have an outer wrap of prestretched polyester tape to keep the steam from permeating the layers of tape and weakening the bond.

The use of a lead press seems to have merit. A lead sheath could be extruded over the taped cable, and the cable could then be vulcanized in an autoclave. The lead sheath would be removed following vulcanization. This technique should give good cure and impart a smooth surface to the finished cable.

★ ★ ★

Because of the versatility of silicone rubber, any of the preceding methods may be employed to complete the cure of the semi-vulcanized silicone rubber taped cable. The choice depends on what equipment is available to a particular manufacturer.

★ ★ ★

The layer-to-layer bond strength of the completed cable is a function of cure time at a specified temperature. This is shown by Figure 7.

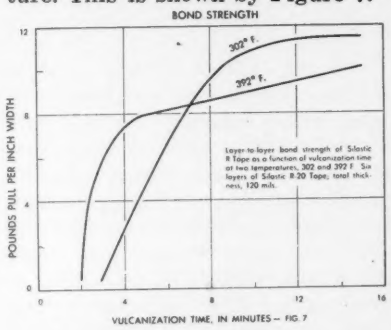


FIG. 7

Conductive Silicone Rubber

A conductive silicone rubber has recently been developed that can be produced in the form of semi-vulcanized tape. This compound can be blended with a variety of non-conductive silicone rubber stocks to yield tapes with a wide range of conductivities. Tapes made from these compounds make excellent stress relieving sheaths for corona suppression. When used in conjunction with other semi-vulcanized silicone rubber tapes, the conductive sheath bonds into the system. This makes a homogenous, void-free insulating structure.

Structure of Cable

Figure 9 shows the insulation structure for a 500 MCM cable. An inner sheath of conductive tape is applied to the conductor followed

Fig. 9—Structure of a 500 MCM cable insulated with semi-vulcanized silicone rubber tape. Note flexibility of the insulation. * * * *

by an insulation wall of semi-vulcanized silicone rubber tape. The outside sheath is a layer of conductive silicone rubber tape. Note the flexibility of the insulation and the ease with which it is removed from the conductor.

★ ★ ★

Since the semi-vulcanized silicone rubber tape cures into a fully bonded system, splicing and terminations are easier than with fully cured unbonded tape systems. The insulation is easily removed from the conductor without the insulation unwinding. The splice can be re-covered with semi-vulcanized tape and heated to complete the cure. If it is impracticable to heat the splice or termination, it can be recovered with room temperature vulcanizing silicone rubber.

Radiation Resistance

Preliminary investigations of the radiation resistance of the semi-vulcanized cable insulation indicate that this insulating system is suitable for many applications involving both high-temperatures and nuclear radiation. The physical integrity of this system after irradiation is better than that of extruded silicone rubber insulation because of the glass reinforcement. The specific inductive capacitance increases 10 percent after a radiation dose of 200 megarads; the electric strength at 60 cycles per second is not affected significantly. Although the dissipation factor (at 60 cycles per second) is doubled by this dose, the dielectric losses are not excessive for many cable applications.

★ ★ ★

Tests on the dielectric properties of a semi-vulcanized cable insulating system in a radiation field and also at elevated temperatures are still in progress. However, initial data show that such an insulating system is practical for radiation doses up to 200 megarads. Where extreme flexibility is not required, such insulation is serviceable for doses up to 400 megarads.

Heat and Flame Resistance

The excellent electrical properties of silicone rubber are retained in the semi-vulcanized tape as shown in Figure 8. This shows the effect of elevated temperatures on capacitance, dissipation factor, and electrical strength. Capacitance and dissipation factor are almost unaffected by exposure to elevated temperatures while electric strength decreases slightly.

★ ★ ★

Figure 10 demonstrates the flame resistance of semi-vulcanized silicone rubber tape. The glass reinforcement prevents the non-conductive silicone rubber ash from falling from the conductor. This maintains the electrical integrity of the cable even when subjected to high temperature flame as shown in the photograph.

Outstanding Properties

Experience with both fully vulcanized and semi-vulcanized tapes indicates that the outstanding properties of the semi-vulcanized tape system are:

1. Each layer bonds firmly to the underlying layer; layers cannot slide and become displaced. This is important when the cable is flexed, either when it is installed or in service. Electrical properties are not degraded after continuous flexing.

2. Insulation is essentially void free. Therefore, corona start voltage is high; dissipation factor at operating voltages is low.

3. Low dissipation factor, high insulation resistance and good electric strength are inherent properties of Silastic. These properties remain unchanged at high temperatures and after aging at high temperatures.

4. Since the tape is bonded, moisture cannot penetrate the insulation and degrade the properties.

5. Terminations and splices are easy to make because the tape will not unwrap or loosen at the cut ends.

6. Conducting Silastic shielding tapes can be bonded into the insulating structure, virtually eliminating the possibility of corona. Metallic shields may not be necessary.

7. Such barrier tapes as Mylar are not necessary. Therefore, the full heat stability of the Silastic is available to withstand emergency overloads. Also, there may be less tendency toward contamination which may be caused by organic barrier tapes.

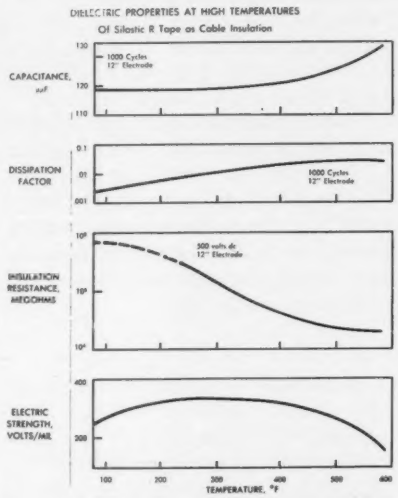


Fig. 8—Measurements made on 250 MCM cable covered with 6 layers (90 mil) silastic R-15 tape. Vulcanized only. * * * * * *

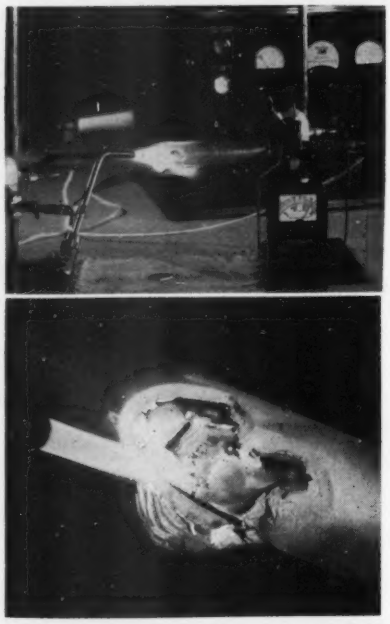


Fig. 10—The intense heat of a gas torch fails to destroy the electrical integrity of silastic tape as cable insulation, even when the outer aluminum electrode melts. The 500 MCM cable tested here is insulated with 6 layers of silastic R-20 tape. Outer electrode is formed of 16 gauge aluminum. Picture at top is close-up view of result of flame application. * * * *

(*Please turn to page* 343)

The Production of Wire Screening

by Jack C. Heilig, Secretary
Heilig Brothers' Company
York, Pennsylvania

In the new plant for the production of wire screening described here, nothing has been overlooked that would contribute to production efficiency.

Our new insect wire screen plant at York, Pa., is recognized as the latest, most modern of this type. The weaving mill contains a battery of 200 looms, the output of which averages some 250,000 square feet of screening per day. The plant works three shifts in continuous 'round-the-clock production, six days a week. Jobs are provided for 200 employees.

★ ★ ★

Production flows in a nearly straight line through successive operations that begin with the unloading of raw material, continue with wire drawing and weaving, and end with inspection, packaging, storage and shipment. Equipment includes a $100,000 mechanical rectifier to provide direct current for wire drawing. Another new development is a system for the continuous filtration of the drawing lubricant.

★ ★ ★

Behind the new building and its equipment lies a story that stretches over several decades. In the long-ago days before the first World War, two brothers were learning the textile business the hard way by working for a manufacturer at Mount Joy, Pa. After they had acquired sufficient experience, they founded a textile factory of their own at Carlisle, Pa. In 1918 they moved to York to go into the tire business.

★ ★ ★

C. H. and **B. F. Heilig** had invented a loom for weaving tire fabric on a bias, something no tire manufacturer had been able to do. It looked like a sure fortune, but the bottom fell out in just a few years. Gum-dipped cord tires came on the market to replace the tires using woven fabric. To keep their looms busy, the brothers were forced to look for another product to weave. They found it in insect screening.

★ ★ ★

The screening industry was then (1923) about 40 years old. Through a series of peculiar circumstances, York County, Pennsylvania, at that time accounted for 87% of all wire cloth woven in the United States. Though the industry of today is no longer so strongly localized, York County still remains its major center. A surprisingly large number of independent screen cloth manufacturers are squeezed within this comparatively small area. Though competition was, and still is, strong, the brothers were convinced that they could make a success of this business. Their confidence has been fully justified.

★ ★ ★

In 1956 the ever increasing demand for its products necessitated the Company's moving from its old plant in downtown York to a new one-story building at the foot of North Ogontz Street on the north-eastern boundary of the city. This building is 900 ft. long by 200 ft. wide, providing 180,000 sq. ft. of floor space for manufacturing, storage and offices. It is of truss-roof construction without center posts to interfere with the plant layout. The weaving mill is contained under a single 100-ft. span, 800 ft. long.

★ ★ ★

A few words about the present officers of the company may be of interest. **C. H. Heilig,** one of the founders, died in 1952. His only child died shortly afterwards. The second-generation Heiligs now active in the firm are the sons of the other founder, **B. F. Heilig,** who is president and treasurer. **B. F. Heilig, Jr.,** is vice-president; **Jack C. Heilig,** secretary, and **John K. Heilig,** assistant secretary and treasurer.

Products

The firm manufactures four standard screen products, marketed under the tradenames of: "Century" (aluminum), "Yorkbest" (galvanized steel), "Marigold" (bronze) and "Egyptian" (bronze). Widths range from 16 to 60 inches, the 60-in. width being demanded for screened-in porches. For home window screening, the 30 and 36 in. widths are the most popular.

★ ★ ★

The steel screening is woven from hard-drawn steel wire and is uniformly coated after weaving with a heavy layer of electrolytic zinc. Properly taken care of, this low-cost screening has a life expectancy of from four to six years.

★ ★ ★

Aluminum screening is priced about 50% higher than steel, but will last from ten to twelve years. Aluminum is today the most popular screening, partly so because of its long life and good corrosion resistance. Aluminum screens are also favored by homeowners because their light color goes so well with white-painted woodwork.

★ ★ ★

Bronze screening is the preferred choice of homeowners who insist upon having the best. As far as corrosion resistance and wearing qualities are concerned, bronze screening is definitely superior. It costs 2½ times as much as our

galvanized steel screening, but has a life expectancy of from 15 to 20 years.

Drawing the Wire

All of this screening is woven from fine wire, which is drawn to precision gauges in the plant. For "Yorkbest" we use a low-carbon steel having 0.04% carbon, 0.20% manganese, 0.010% phosphorus and 0.028% sulfur. It is purchased in the form of 600-lb. coils of 7/32-in. lime coated rod. The coils are unloaded from freight cars on the boom of a lift truck, capable of picking up three to five coils at a time.

★ ★ ★

A six-die Vaughn break-down machine reduces the 7/32-in. rod to intermediate wire size and is

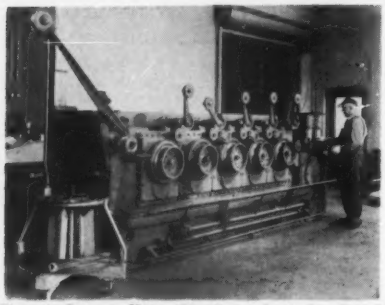


Fig. 1—Intermediate drawing of steel wire is done on this 6-die Vaughn machine. * *

drawn through a second series of six dies. When the wire leaves the last die on the intermediate machine, it has become so work-hardened that further drawing is impossible. Its ductility is then restored by annealing, to be later described.

★ ★ ★

For the break-down and intermediate dies, the lubricant is a dry soap powder. The lime coating on the rod provides a bond for the powder as the wire goes through the sequence of dies.

★ ★ ★

Final drawing is done, after annealing and other processing, on ten Vaughn "12HF" fine wire machines. On each machine, 12 dies reduce the wire to its ultimate diameter of 0.011 in. Operating speed is normally at 3,500 fpm, which is under the speeds for final drawing of aluminum and bronze wires. The lubricant is a solution of animal fats, which keeps the dies cooler than any other lubricant that has been tried.

★ ★ ★

Raw material for aluminum screening is 0.064-in. "Alclad 5056" wire, made specially for insect screening. This particular alloy is characterized by a ductility that will allow it to be drawn to fine-gauge wire. Ten Vaughn "16 CF-K" machines reduce the diameter from 0.064 to 0.013 in. Wire drawing at 4,500 fpm is normal operating speed, but a top speed of 5,500 fpm can be obtained. The desired speed is set by a single rheostat control after the dies have been threaded.

★ ★ ★

While each machine has places for 16 dies, it has been found practicable to do the job with 14 dies. Eight are tungsten-carbide and six are diamond dies. They are inspected daily and dies showing wear are removed to be recut and polished. Skilled die room operators can increase die diameter by as little as 0.001 in.

★ ★ ★

Lubricant for aluminum drawing is a compound of mineral oil (95%) and lard (5%). Since it is expensive in the quantities that are required, a system was designed that would reclaim it after use. The lubricant is returned to a filtration tank through a sunken channel in the concrete floor and after purification by filters is pumped overhead to the bank of aluminum drawing units. Continuous filtration of lubricant, an innovation in our industry, keeps the dies clean and to accurate gauge at all times. The system is used only with the lubricant for aluminum drawing.

★ ★ ★

Bronze comes to us in the form of 0.1285-in. rod (No. 8 gauge, B&S). It is a composition of 90% copper and 10% tin and other alloying elements. Our "Egyptian" and "Marigold" brands both use the same bronze, the difference between these two screenings being

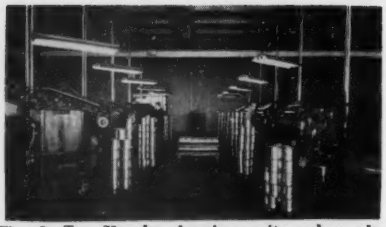


Fig. 2—Ten Vaughn drawing units reduce aluminum wire diameter from 0.064 to 0.013 in. Each machine uses 14 dies. * * * *

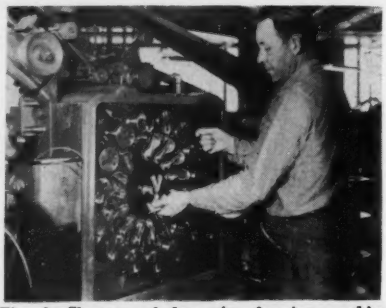


Fig. 3—Close-up of fine wire drawing machine interior. Operator threads the wire through a series of dies, each of which reduces the diameter until the precise size is attained. * *

in their finishing.

★ ★ ★

Formerly it was the practice to stock three gauges of bronze wire —0.011, 0.010 and 0.0095 in. This headache has been avoided by drawing all bronze to the same final diameter as steel; namely, 0.011 in.

★ ★ ★

The drawing of bronze wire is done in two stages. First, a 12-die Syncro intermediate machine reduces the No. 8 gauge to a suitable size for fine-wire drawing. Final drawing is done at a speed of from 4,000 to 5,000 fpm on eight 16-die machines (Syncro and Waterbury-Farrel). The lubricant for both stages of drawing is the same animal-fat solution employed for final steel drawing.

★ ★ ★

Power might have been the Number One problem because of the large direct-current load created by the many variable-speed motors used in drawing the wire. High power losses in the conversion of the AC supply to DC operating current could represent a substantial extra operating cost and it was deemed profitable to invest around $100,000 in a mechanical-type rectifier.

★ ★ ★

This unit achieves a conversion

efficiency of close to 97%. It is rated at 2,000 amps, 250 volts, DC. Maximum rated overload is 3,000 amperes for one minute. Advantages obtained are: reliability of DC power, direct savings in power cost, low maintenance, good voltage control, minimum operator attention and small space requirements. This compact power center includes AC switchgear and transformers, rectifier, DC protective equipment and DC motor control centers. A metal-enclosed bus carries direct current to the starters of the individual motors, which are actuated by pushbuttons on the drawing machines.

Annealing and Cleaning Processes

After passage through the break-down and intermediate dies, the steel wire has become so work-hardened that it cannot be drawn to finer sizes and ductility is restored by annealing. The wire is passed through a molten salt bath held at a temperature of around 1,300°F and then through a quench tank, where cold water reduces its temperature and washes off the salt. Further operations at this time are pickling in sulfuric acid and electroplating with copper. The copper plating adds durability and assures more effective galvanizing of the woven screen. After the copper deposit has been added, the steel wire is drawn to final diameter as previously described.

★ ★ ★

Aluminum wire is annealed after the final drawing in a hot-air furnace at a temperature of around 250°F. No cleaning is done until after weaving.

★ ★ ★

Bronze wire requires no annealing since it does not lose its ductility under drawing. Neither is cleaning necessary.

Winding and Weaving

Prior to weaving, warp drums and bobbins must be wound. In the warp mill, spools of wire from the final drawing are fed onto the warp drums. The trick is to provide a separate place upon the big drum for each lengthwise or warp wire. What this means can be easily shown by a little arithmetic. The standard mesh has 18 warp wires for every inch. Screening 30 in. wide will therefore require a total of 540 warp wires, each of which is fed onto the drum from a separate spool.

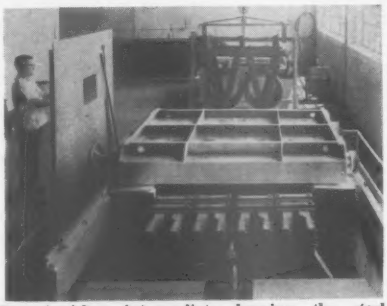


Fig. 4—After intermediate drawing, the steel wire is annealed in an Ajax furnace to restore its ductility for the final drawing. The molten salt bath is held at 1,300°F.

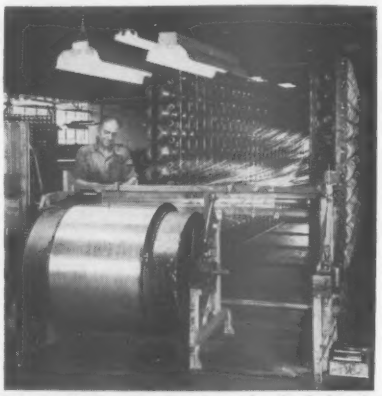


Fig. 5—Spools of wire from the final drawing are being fed onto a warp drum to provide lengthwise wires of the screening. The perforated reed keeps each wire in its proper place. When fully wound, the drum will hold enough wire for about a mile of screening.

Fig. 6—This wire is being fed from spools to bobbins. The bobbins carry the cross or filler wires that are woven into the warp.

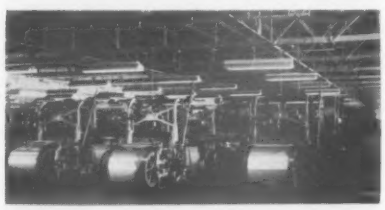


Fig. 7—One of the several sections of Heilig's weaving department, occupying 80,000 sq. ft. of floor space in the new plant. The big battery of looms weaves thousands of feet of aluminum, bronze and steel screening an hour. Uniform weaving of precision-gauge wire produces screening of even mesh that lies flat when unrolled.

★ ★ ★

How do you keep your wires from getting crossed? The secret is a perforated reed, having the same number of holes as the number of wires required. The wires are threaded through these openings—540 of them in the case of our 30-in. screening of standard mesh—before being wound on the drum. By changing reeds, either mesh or screen width may be changed—or both at the same time.

★ ★ ★

When fully wound, a warp drum is able to provide a mile of screening. Multiply the number of feet in a mile by 540, and you can see that a drum holds a lot of wire. It is transported to the loom area by a 25-ft. crane and installed on the loom with the aid of a dolly or lift truck. Now comes another tedious chore. The ends of the many separate wires — say 540 — must be fed through openings in another perforated reed, which is a duplicate of the reed used for winding the drum.

★ ★ ★

The cross or filler wires are wound upon bobbins, very much smaller than the warp drums since they must be carried back and forth across the warp. In weaving, every alternate wire of the warp is made to reverse direction; **i.e.,** if the first wire goes upward, the second will go downward, the third upward, the fourth downward, etc. all the way across the loom. The bobbin, which is attached to a flying shuttle, is passed between the two parts of the warp to add the cross wires. Back and forth it travels across the loom, so swiftly the eye can scarcely follow it.

★ ★ ★

While warp and filler strands are being woven together, the two edges of the screening are being reinforced by weaving in additional wires. A special method patented by the company produces

the "ribbon edge" that features all of its screening.

★ ★ ★

A battery of 200 looms uniformly weaves thousands of feet of screening per hour. Standard mesh is 18 by 14, which means that there are 18 wires to the inch lengthwise and 14 wires to the inch crosswise. Either warp or filler wire may be altered if necessary. To meet special orders, it is necessary sometimes to weave 12 by 16, 16 by 16, 18 by 18, 18 by 20 and even the coarse 8 by 8 mesh.

★ ★ ★

The process as described here is in general the same for aluminum, steel and bronze screening. However, different metals require different weaving techniques, a discussion of which is beyond the scope of this article. Weaving is by no means as simple as it appears to an outside observer. A great amount of operator skill and management know-how are required to keep up the consistent quality of the product and to comply with all the requirements of Commercial Standard CS 138-49, as issued by the United States Department of Commerce, and also those of Federal Specification RR-S-141a and amendment No. 1 dated April 23, 1956.

Galvanizing and Enameling

As it comes from the loom, the screening is wound in large rolls, each holding a thousand feet. Mandrels are placed through these rolls to allow the screening to be pulled through other production operations. In continuous motion like a movie film, the steel screening passes successively through a tank of alkali cleaning solution to remove oil and grease, a hot-water rinse, acid pickling to remove rust, a cold-water rinse and two electroplating tanks.

★ ★ ★

Galvanizing is too familiar a process to need description. The method used in this plant requires precise control of the solutions and two baths to assure an extra-heavy layer of zinc, the best known protective agent for steel screening. From the plating tanks, the screening is fed through a gas-heated drying oven and is then immersed in gray enamel. The satin finish resulting enhances the appearance and betters resistance to weathering.

★ ★ ★

From the paint dip, the galvanized steel screening travels in a continuous sheet up and down the sides of a tower 55 ft high. Two passes up and two passes down are needed to dry the paint. A gas-

Fig. 8—After steel screening has been galvanized and oven-dried, a satin-finish gray enamel is applied to improve weather resistance and appearance.

fired oven within the tower maintains the proper temperature. The same tower is also used for drying aluminum and bronze screening after finishing. The oven temperature may be varied from 200°F to 500°F, permitting wide flexibility in the selection of finishes.

★ ★ ★

The same alkali solution that degreases the aluminum screening also etches the wires, providing rough surfaces to which paint will readily adhere. The solution is controlled to assure the degree of etching that will provide the best bond for the paint. An aluminum leafing paint is used. The "leaves"

Fig. 9—Heilig aluminum screening receives a coating of aluminum leafing paint, which adds to its looks without changing the color. The two bronze screenings are coated with flexible lacquer in this same department.

are small particles of aluminum, carried by in a varnish vehicle. Seen under a microscope, a painted wire appears to be covered with myriads of interlocking scales. Painting the aluminum screening improves its weather resistance and durability, but leaves the natural aluminum color unchanged.

★ ★ ★

For "Marigold" bronze, the natural golden color is left unaltered. For "Egyptian" bronze, a chemical process darkens the color to the rich, dark shade of antique bronze. Whether the finish is light or dark, all bronze screening receives a coating of a flexible lacquer to preserve its color and prevent soiling.

★ ★ ★

The screening is again wound in 1,000-ft. rolls when it reaches the bottom of the tower at the end of the drying cycle. These are power trucked to the inspection department. Every square foot of screening is carefully examined for weaving flaws and other defects. The screening that passes inspection is packaged in standard 100-ft rolls for storage or immediate shipment. A 900-ft. railroad siding connects with the plant, and a 200-ft. platform is provided for truck loading. Storage space to hold several months' supply of each of the company's standard products is provided by a 200 by 200 ft. warehouse section.

Quality Control

The raw materials processed are controlled by chemical analyses and physical testing in a central technical laboratory. Control stations are also scattered throughout the plant to assure continuous control of product quality at various production stages.

★ ★ ★

Rigid controls, up-to-the-minute facilities, streamlined production —these are the impressions one would receive upon a visit to Heilig's new plant. The production of quality insect screening has been completely integrated from the arrival of the raw materials to the shipment of the final product.

Transistorized Continuity Test Set

by J. C. Hauf and H. S. Hall
Development and Design Engineers
Western Electric Company, Inc.
Baltimore, Maryland

In this article the authors describe a new continuity test set developed at the Breeze Point Works that has proven both efficient and reliable.

Process testing of insulated conductors within a cable for continuity, shorts and crosses has long been performed by means of a ringout box. The box contained a relay, bell and dry cells and was mounted on wheels so it could be pulled around from place to place to perform the required tests. These sets were large and heavy and required several dry cells because of the high current required to operate the bell. They were subject to frequent repair and adjustment due to vibration and rough handling. As increased production schedules increased the number of tests into the millions per year, it was felt that a new design was needed.

New Test Set for Pulp and Paper Insulated Cables

In the design of the new set, the following features were desired:

1. **Portability**
2. **Light Weight**
3. **Ruggedness**
4. **Reduced Maintenance**

★ ★ ★

In addition, it was necesary to retain a feature of the older design. This was the elimination of the possibility of false indications of continuity and shorts resulting from excessive leakage currents between adjacent paper insulated conductors of a cable on days when the humidity is high. This was formerly done by adjusting the relay to operate through resistances up to 2100 ohms and to be inoperative for higher values.

★ ★ ★

In order to meet the first and second requirements, a transistorized oscillator circuit seemed to be the answer. The third and fourth requirements are met by the inherent characteristics of the transistor, that is, extreme ruggedness and low power consumption, which in turn result in long intervals between battery replacement. The small size and light weight of the transistor circuit permits mounting all components, including mercury batteries, within a hand held test probe approximately the same size as the probe used on the older bell type ringout set. The compactness of the new set permits easy handling and convenient storage, thereby reducing the possibility of mishandling or abuse.

Circuit

The circuit was designed around a PNP junction transistor connected in an audio oscillator circuit. Feedback from output to input, in order to sustain oscillation, is provided by a subminiature transformer coupled through series resistance and capacitance as shown in Fig. 1.

★ ★ ★

The test leads are inserted in series with the collector circuit so that the d-c path between the collector and battery is completed through the external circuit under test. The amount of resistance which can be tolerated in the collector circuit and still maintain oscillation is dependent to a large extent on the value of bias resistance R1. This fact is used to advantage by selecting R1 so the circuit will cease to oscillate when the desired cutoff resistance is connected across the test leads. The value of R1 must be determined individually for each test set due to the variation of individual transistor characteristics. In addition, the cut off point is quite sensitive to temperature, which must be considered in selecting R1. This is due to the temperature sensitivity of the transistor. Figures 2 and 3 show how the cutoff resistance value is dependent upon these two factors. The use of these curves in the development of this test set was of extreme importance.

General Assembly

The power source chosen was a 2.6 volt mercury battery having a 1000 milliampere-hour capacity. This type of battery features high

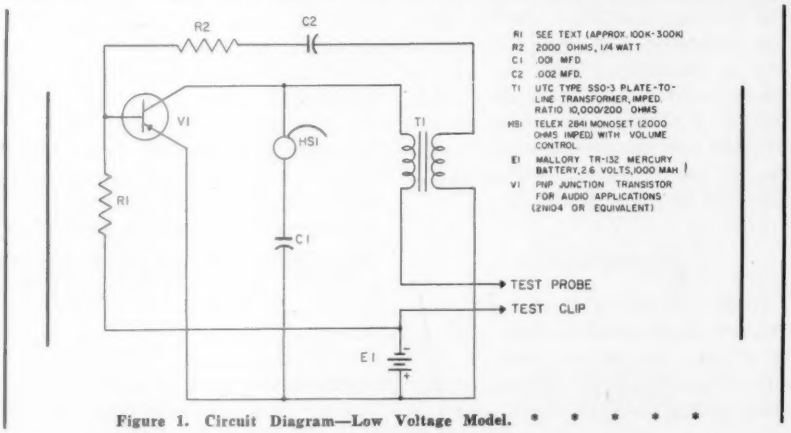


Figure 1. Circuit Diagram—Low Voltage Model. • • • • •

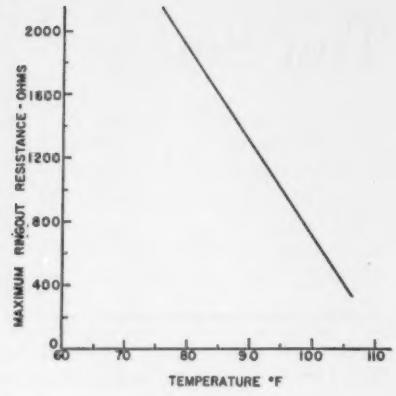


Figure 2. Variation of Cutoff with Temperature.

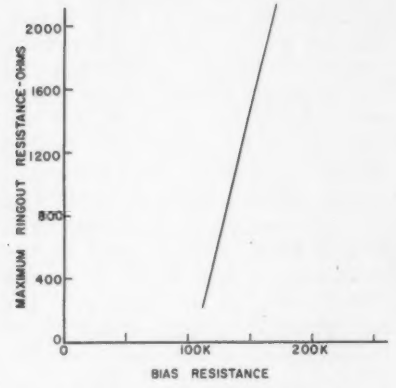


Figure 3. Variation of Cutoff with Bias.

capacity, small size, long shelf life and reasonably uniform output voltage throughout its life. The chassis and battery slip into the hand held test probe much like a flashlight cell slips into a case. One side of the test circuit is attached through the probe case to the probe tip. The opposite side of the test circuit runs through a connector at the rear of the probe to a test clip for attaching to one end of the conductor under test. The output of the oscillator is fed into a miniature headset via a volume control in the headset lead. Figure 4 shows the complete assembled unit compared with the old ringout box. Figure 5 compares the two sets in operation.

Characteristics

Under operating conditions with the test leads shorted, current consumption is approximately 370 microamperes. With the test leads open, there is a constant current

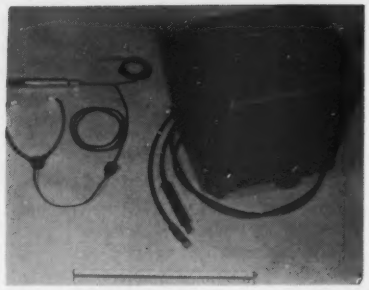


Figure 4. Transistorized Set (left) and Old Ringout Box (right).

Figure 5. Inspector Using Old Ringout Box (left) and New Transistorized Set (right).

drain of approximately 30 microamperes. The estimated battery life is in excess of one year.

Modified Set for Plastic Insulated Cable

The initial model proved to be very satisfactory for its intended application, i.e. process testing paper insulated cable, but it was not suitable for final inspection of plastic insulated cable. Test specifications required application of a higher voltage to the cable than was possible from this unit. Specifically, the supply voltage for continuity testing must be between 10 and 55 volts, and for testing for shorts and crosses it must be between 45 and 105 volts. However, on the advantageous side, there would be no problem with plastic insulated cable from false test results due to moisture absorption in the conductor insulation, as there was with paper insulation. This naturally led to the desirability of adding features not previously possible; namely, different ringout sensitivities for continuity and short tests. For continuity tests, ringout should be possible only through low resistance, while for short and cross tests, the resistance range through which ringout is possible should be extended to include relatively high resistance. Consequently, further development was initiated to determine how the original transistorized design could be adapted to meet these new requirements, with its attendant advantages retained.

Circuit

The requirement for a higher supply voltage was met by using a higher voltage battery and a series resistance to limit the current drawn by the transistor. This arrangement, however, created other problems. First, the increase in battery voltage meant an increase in size and a decrease in capacity of the battery. Secondly, whereas in the original design the no load current was kept small because of the high resistance in the base circuit, the higher battery voltage resulted in a higher no load current drain since the base resistor remained fixed and the battery series resistance had to be selected for optimum value under load conditions rather than open circuit conditions. Finally, the battery series resistance became a controlling factor in determining total current drain and effectively acted to create a constant current power source. This prevented the natural increase in transistor current with temperature which would have maintained oscillation at the higher ambient temperatures and necessitated setting the operating current at a somewhat higher value than in the original low voltage circuit. All of these things would act to increase battery drain and decrease battery life.

★ ★ ★

The change in sensitivity of the circuit to ringout resistance was accomplished by providing alternate locations in the circuit for the test leads. For continuity testing, the test leads were kept in the collector circuit, with the ringout

(*Please turn to page* 329)

Choose...

Du Pont ALATHON® and ZYTEL®

POLYETHYLENE RESINS — NYLON RESINS

for properties tailored to your insulating and jacketing needs

Through careful control of the molecular structure and the addition of stabilizers and other ingredients, Du Pont has developed an entire family of ALATHON polyethylene resins, each suited to a specific wire and cable use.

There is also a family of ZYTEL nylon resins tailored for specific end uses, to give you a complete selection of resins for your insulating and jacketing needs.

The handy chart inside will help you select the ALATHON or ZYTEL best suited to your own requirements. You may want to tear it out (it's perforated) and save it.

ALATHON® and ZYTEL®
POLYETHYLENE RESINS NYLON RESINS
FOR WIRE & CABLE

SEE SELECTOR CHART INSIDE

POLYCHEMICALS DEPARTMENT

DU PONT
REG. U.S. PAT. OFF.

Better Things for Better Living . . . *through Chemistry*

SELECTOR CHART FOR DU PO

APPLICATION	PROPERTIES REQUIRED	PUBLIC SPECIFICATIONS	PRODUCT RECOMMENDATION
TELEPHONE CABLE			
Insulation	Electrical Abrasion Resistance	REA-PE-14 ASTM-D-1248-52T, II, 4	"Alathon" PE-3066 "Alathon" 3C (Colors) "Alathon" 5B, NC-10
		L-P-590-II-4	"Alathon" 5B, NC-10
Jacket	Weather Resistance Environmental Stress Crack Resistance Abrasion Resistance	REA-PE-14 ASTM-D-1248-52T, II, 6* CAA-1046	"Alathon" 4, BK-30
TELEPHONE WIRE			
Rural—B Insulation	Weather Resistance Electrical Abrasion Resistance	REA-PE-15	"Alathon" 4, BK-30
Rural—C Insulation	Weather Resistance Electrical Abrasion Resistance	REA-PE-17	"Alathon" 4, BK-30
CONTROL CABLE			
Primary Insulation	Electrical Abrasion Resistance	ASTM-D-1248-52T, II, 4	"Alathon" PE-3066 "Alathon" 3C (Colors) "Alathon" 5B, NC-10
		L-P-590-II-4	"Alathon" 5B, NC-10
Conductor Jacket	Flame Retardant	U/L-70	"Rulan" 2, NC-10
	Abrasion Resistance	—	"Zytel" 33
Outer Jacket	Weather Resistance Environmental Stress Crack Resistance Abrasion Resistance	—	"Zytel" 37X
		ASTM-D-1248-52T, II, 6*	"Alathon" 4, BK-30
	Flame Retardant	ASTM-D-635	"Rulan" 2, BK-48
HIGH VOLTAGE POWER CABLE			
Insulation	Electrical Environmental Stress Crack Resistance	L-P-590-II-7	"Alathon" 3B, NC-10
		—	"Alathon" 3B, NC-10 "Alathon" 5, NC-10 "Alathon" 5B, NC-10
		L-P-590-II-4	"Alathon" 5B, NC-10
Jacket	Weather Resistance Environmental Stress Crack Resistance Abrasion Resistance	ASTM-D-1248-52T, II, 6*	"Alathon" 4, BK-30
LOW VOLTAGE POWER CABLE			
Insulation and Jacket	Weather Resistance Electrical Environmental Stress Crack Resistance Abrasion Resistance	ASTM-D-1248-52T, II, 6*	"Alathon" 4, BK-30
TV LEAD WIRE	Electrical Weather Resistance	ASTM-D-1248-52T, II, 5 L-P-590-II-5	"Alathon" 5, BN-07

*Except melt index

NT ALATHON® RULAN® ZYTEL®

POLYETHYLENE RESINS — FLAME RETARDANT PLASTICS — NYLON RESINS

APPLICATION	PROPERTIES REQUIRED	PUBLIC SPECIFICATIONS	PRODUCT RECOMMENDATION
WD-1 INFANTRY FIELD WIRE Insulation	Electrical Weather Resistance	MIL-C-13294	"Alathon" 5, BK-21
Jacket	Weather Resistance Abrasion Resistance	MIL-C-13294	"Zytel" 3606
GASOLINE STATION WIRE Insulation	Electrical	U/L	"Rulan" 2, NC-10
Jacket	Chemical Resistance Abrasion Resistance	—	"Zytel" 33
LINE AND SERVICE DROP WIRE	Weather Resistance Abrasion Resistance Electrical	ASTM-D-1248-52T, II, 6* ASA-6 IPCEA	"Alathon" 4, BK-30 "Alathon" 5, BK-22 "Alathon" 5L, BK-22
TREE WIRE	Weather Resistance Abrasion Resistance Electrical	ASTM-D-1248-52T, II, 6*	"Alathon" 4, BK-30
	Abrasion Resistance Weather Resistance	—	"Zytel" 37X
AIRCRAFT HOOKUP WIRE JACKET	Abrasion Resistance Chemical Resistance	MIL-W-16878 A & B MIL-W-5274 A MIL-W-76A MIL-W-5086 ASTM-D-789-53T	"Zytel" 33
GTO CABLE	Electrical	L-P-590-II-7	"Alathon" 3B, NC-10
Insulation		U/L	"Alathon" 3B, NC-10 "Alathon" 5B, NC-10
		L-P-590-II-4	"Alathon" 5B, NC-10
Jacket	Flame Retardant	U/L	"Rulan" 2, NC-10 "Rulan" 2, BK-48
Insulation and Jacket	Electrical Flame Retardant	U/L	"Rulan" 2, NC-10
COAXIAL CABLE Insulation	Electrical	ASTM-D-1248-52T, II, 4 L-P-590-II-4	"Alathon" 5B, NC-10
Jacket	Weather Resistance Environmental Stress Crack Resistance Abrasion Resistance	ASTM-D-1248-52T, II, 6*	"Alathon" 4, BK-30
BUILDING WIRE INSULATION	Electrical Abrasion Resistance Flame Retardant	U/L	"Rulan" 2, NC-10

DU PONT

REG. U.S. PAT. OFF.

Better Things for Better Living
... through Chemistry

These are the advantages of Du Pont ALATHON® and ZYTEL®

POLYETHYLENE RESINS — NYLON RESINS

for insulation and jacketing

Du Pont ALATHON polyethylene resins and ZYTEL nylon resins combine various properties to give you the best results for your insulating and jacketing applications.

ALATHON resins provide such advantages as special protection against weathering, minimum power factor and dielectric losses, resistance to environmental stress cracking, abrasion resistance and greatly extended service life. For exceptional resistance to abrasion, environmental stress cracking, weather and chemicals in a jacketing material, there are several ZYTEL resins to choose from. Insulation and jacketing of ALATHON and ZYTEL are lightweight, clean, easy to handle.

Remember, whatever your requirements in an insulating or jacketing material, Du Pont has developed ALATHON polyethylene resins and ZYTEL nylon resins specially suited to your needs.

For further information on the advantages of wire and cable constructions using an ALATHON or a ZYTEL, write or call: E. I. du Pont de Nemours & Co. (Inc.), Polychemicals Department, Room 453, Du Pont Building, Wilmington 98, Delaware.

DISTRICT OFFICES

CHICAGO
7250 N. Cicero Ave., Lincolnwood, Chicago 30, Ill.

LOS ANGELES
2930 E. 44th St., Los Angeles 58, Cal.

NEW YORK
350 Fifth Ave., New York 1, N. Y.

DETROIT
13000 W. Seven Mile Road, Detroit 35, Mich.

BOSTON
140 Federal St., Boston 10, Mass.

PHILADELPHIA
1616 Walnut St., Philadelphia 3, Pa.

ST. LOUIS
818 Olive St., St. Louis 1, Mo.

IN CANADA Du Pont Company of Canada (1956) Ltd., Box 660, Montreal, Quebec

GENERAL EXPORT E. I. du Pont de Nemours & Co. (Inc.), Polychemicals Department
Du Pont Building, Wilmington 98, Delaware. Attention: Export Section

The Du Pont Company assumes no obligation or liability for any advice furnished by it, or results obtained with respect to these products. All such advice is given and accepted at the buyer's risk. Du Pont warrants that the materials themselves do not infringe the claims of any United States patent, but no license is implied; nor is any further patent warranty made.

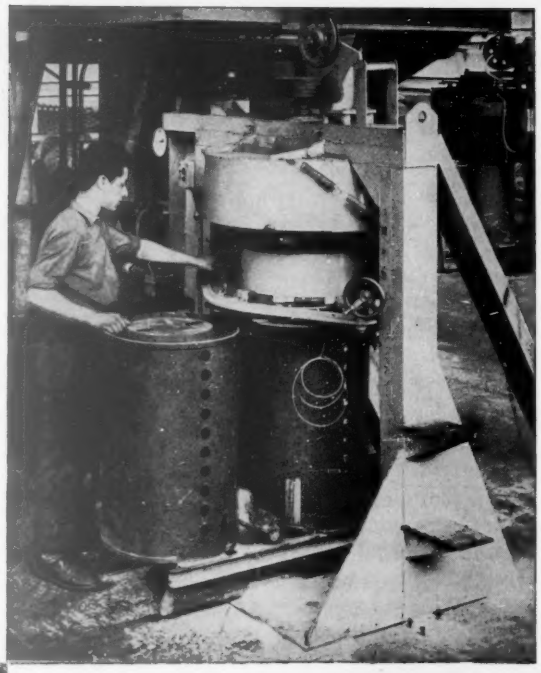
6.500

feet per minute

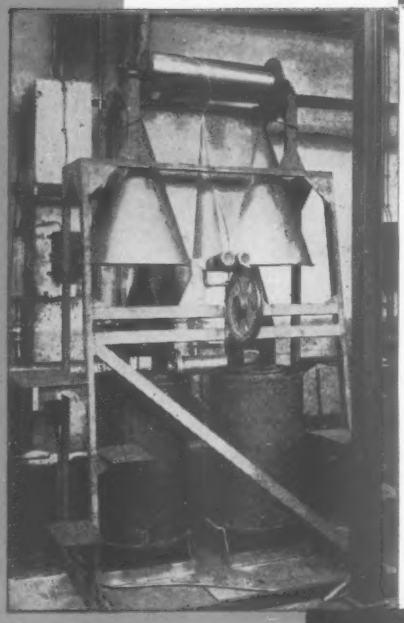
is the speed never reached before of the new continuous

Godderidge

Packaging Unit



Take-up device on a wire-drawing machine.



Double high-speed Pay-Off Stand

OUTSTANDING FEATURES :

- Range of diameter: from 8 to 24 B & S
- Changing of drums at full speed
- Diameter control possible whilst running
- Both-ends of wire accessible, therefore welding and continuous supply of high speed extruders possible by new double

PAY-OFF STAND

For further details write to

Godderidge

11, avenue Henri Barbusse HOUILLES (Seine-et-Oise)

FRANCE

JEAN MAROGOBNE

Mechanical Descaling and Drawing of Mild Steel Rod

by L. Marsden, Esq.
J. & A. Binns Limited
Halifax, England

PART I

Layout of Equipment

In the constant search for an efficient mechanical means of scale removal, several devices have been developed. The author, a practical wire drawer, gives some observations on his company's experience with mechanical descaling procedures.

This paper was the Staff School Medal Award winner.

The paper was presented on October 22, 1957, before the Staff School of Frederick Smith & Co. Wire Manufacturers Ltd. at Halifax and is published through the courtesy of the company.

General

When planning for the installation of Mechanical Descaling considerable thought was given to the layout of the equipment in order that:

★ ★ ★

a) The most economical use was made of the available floor space.
b) The broken scale from the rod was confined to the smallest possible area.
c) The equipment was so placed as to facilitate ease of operation.

★ ★ ★

It was found that by using the method which I am going to describe it was possible to incorporate all these factors.

★ ★ ★

In order to gain full advantage of mechanical descaling of mild steel rods on a modern drawing machine, it is essential that the rods may be welded while the machine is producing, but at the same time there must not be any unnecessary equipment to hinder the operator. To put it at its simplest the items of plant required were seen to be as follows:

a) A rod pay-off.
b) A mechanical descaling machine.
c) A rotating soaper and drawing machine.

★ ★ ★

When this equipment was placed in a straight line, the distance occupied by the pay-off and the descaler before the first drawing block was about 4½ yards, and this was found to be the most suitable lay-out in respect of floor space economy and ease of operation. The confining of broken scale to a relatively small area was effected to a considerable degree through the type of pay-off used.

Rod Pay-Off

A great deal of attention was paid to this item so as to comply with the idea of keeping the scale in a reasonable area. The "flipper" type was thought of but was rejected because of two reasons:

a) The distance required between flipper and descaling machine.
b) The need to have the rod enter the descaling machine without scraping against the rod guide.

★ ★ ★

The revolving swift was also considered, but decided against because it is impossible with this type of pay-off to weld the rods while the machine is producing.

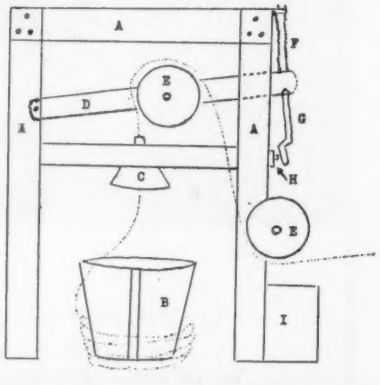
★ ★ ★

The rod pay-off decided upon was the upright steel girder type as shown in Fig. 1. This rod pay-off meets all the desired requirements, and is quite suitable for the purpose because the rod, being mild steel is of a soft nature and pays off quite satisfactorily. It will be seen that the rod pay-off consists of two upright steel girders and a cross girder supporting a guide bell and throat; above the throat there is a large guide pulley mounted on a pivoted arm which is designed to actuate an electrical knock-off switch when under excessive pressure. The knock-off switch and a second guide pulley are located on the front upright girder.

★ ★ ★

The uncleaned rod is placed flat on the floor, a guide basket is placed in position within the coil, and the back end of the rod is left free ready for welding. The running end of the rod is then passed through the guide bell and throat, over the first large guide pulley and beneath the second large guide pulley as shown in Fig. 1. It can now be seen that any excessive

DIAGRAM OF
"ROD PAY OFF"
FIG 1.
NOT TO SCALE



(A) STEEL GIRDER FRAME
(B) GUIDE BASKET
(C) GUIDE BELL & THROAT
(D) TENSION ARM
----- ROD LINE
(E) LARGE GUIDE PULLEYS
(F) TENSION SPRINGS
(G) KNOCK OFF ARM
(H) KNOCK OFF
(I) SCALE BOX

tension applied to the rod will automatically cause the arm to which the large pulley is attached to be brought into play thus operating the knock-off switch and stopping the first drawing block, with the result that breakage of the rod or damage to the plant is avoided.

★ ★ ★

Besides guiding the rod these two large pulleys (which are 18" outside and 12" inside diameter) have another important part to play—as the rod travels over and under these two pulleys much of the scale is cracked loose and so helps the mechanical descaling machine to do its work, particularly when the rod is of uneven shape; the tension created also helps to straighten the rod so that as it is being fed into the mechanical descaling machine it does not rub against the inlet guide on the mechanical descaling machine.

★ ★ ★

There are numerous types of descaling machines but they all work on similar principles, first cracking off the coarse scale from the rod and then removing the fine particles of scale which still adhere to the rod. It is in the second part of the operation that the various types of machine differ most.

★ ★ ★

To achieve the first part, that of removing the majority of the scale from the uncleaned rod, there are usually two or more small diameter pulleys—known as cracking pulleys—set at differing angles; by taking the rod around these cracking pulleys the bulk of scale is cracked off, leaving only a thin layer of dust-like fine particles which require to be removed in order to complete the descaling process.

★ ★ ★

There are a number of ideas about removing this fine scale. In American machines magnetic vibration is used to dislodge the particles. This method has been reported upon in the Wire Industry, but not a great deal is known about the process in this country. The two methods which have received most attention in British Wire Mills are (I) a form of "Barrelling" with the aid of a revolving drum, and (II) brushing with rotary steel wire brushes. In the former method the rod is fed continuously from the cracking pulleys through a revolving drum loaded with some abrasive medium such as granite chips, quartz, leather shavings, hard-wood chips, etc. Up to the time of writing, however, this method has not proved entirely successful.

★ ★ ★

Better results have been obtained with the use of Steel wire brushes. These are so mounted and geared that they revolve in two planes—around their own axis and around the axis of the rod (Fig. 2). They are also adjustable, thus enabling compensation to be made for bristle wear; providing correct adjustment is maintained the life of the brushes will normally exceed 200 tons of rods descaled. Moreover, worn brushes can be replaced with new ones in a matter of minutes, so there is no question of a drawing machine being long out of action whilst the brushes are being changed.

★ ★ ★

For mild steel rods the descaling machines do not require to be separately driven; it is usual to have the revolving brushes or the drum geared to one of the cracking pulleys so that as the rod is being drawn by the first block it acts as a driving belt on the cracking pulley and so, through the gearing, causes the brushes or the drum to revolve.

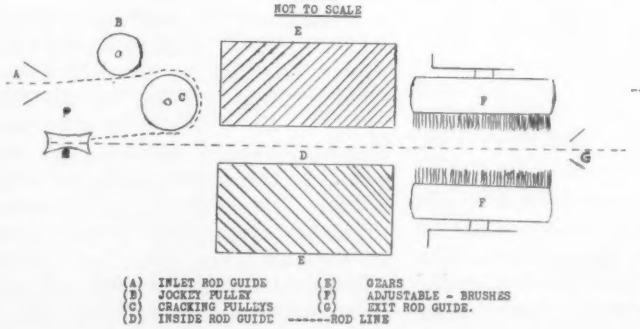
★ ★ ★

The descaling machines are enclosed, but are quite easily threaded up. The broken scale falls into boxes which are placed beneath the cracking pulleys and the revolving brushes. It must be pointed out at this stage that when the descaling process is completed the rod does not have a bright surface, as there still remains an oxide skin of blue-grey colour.

Rotating Soaper and Drawing Machine

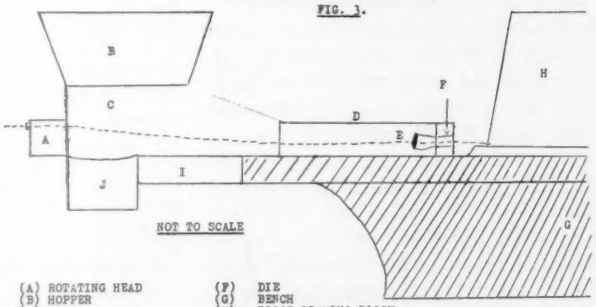
At this stage the rod has a rough surface and, as already mentioned, is covered by an oxide film. In order that material in this condition may satisfactorily be drawn efficient lubrication becomes a vital necessity. Moreover, the lubrication must be one hundred per cent right at the first pass because that is where all the trouble arises; with mechanical descaling if you

DIAGRAM SHOWING PLAN OF MECHANICAL DESCALER
FIG. 2.
NOT TO SCALE



(A) INLET ROD GUIDE
(B) JOCKEY PULLEY
(C) CRACKING PULLEYS
(D) INSIDE ROD GUIDE
(E) GEARS
(F) ADJUSTABLE - BRUSHES
(G) EXIT ROD GUIDE.
------ROD LINE

DIAGRAM SHOWING ROTATING SOAPER and SOAP BOX
FIG. 3.



(A) ROTATING HEAD
(B) HOPPER
(C) BODY
(D) OPEN SOAP BOX
(E) DIE SET SCREW
(F) DIE
(G) BENCH
(H) FIRST DRAWING BLOCK
(I) FIXING BOLTS
(J) GEARS
--------ROD LINE

get the wire at the first pass correct half your troubles are over. I therefore propose to concentrate on the lubricating and drawing at the first pass.

★ ★ ★

As the first drawing block provides, indirectly, the motive power for driving the revolving brushes through the medium of the rod which passes around the geared cracking pulley, the speed of the block governs the speed at which the brushes revolve; the amount of reduction at the first die does also have some effect, but this is very slight.

★ ★ ★

The efficiency of the descaling unit is affected by the speed at which it is required to work. It has been found that when the rod is passed around the cracking pulleys at a slow speed the cracking and removal of the scale is easily achieved. Running at fast speeds not only impairs the scaling efficiency but also gives rise to rather rapid grooving of the cracking pulleys, which can cause a great deal of trouble due to the rod getting nipped in the worn groove. The life of the brushes, in terms of tons of rods processed, is also adversely affected by high speed running.

On the question of lubrication, it was found that, because the descaled rod has no coat other than the oxide skin, special measures had to be taken to ensure adequate soaping at the first pass. The normal average soap box was found to be too short to enable sufficient pick-up of lubrication, and was therefore extended; due to the rod running taut between the cracking pulleys and the first block, tunnelling occurred in the lubricant—although it was of the granulated type—and this proved also to be the case after a pulley was fitted inside the soap box in order to agitate the lubricant.

★ ★ ★

A satisfactory answer to the problem was provided by fitting a rotating soaper to the front of the soap box (Fig. 3); this device works independently of the wire-drawing machine, being separately powered by a small electric motor. The rod passes through an off-centre hole in the head of the rotating soaper with the result that the lubricant is agitated by the constantly circling rod passing through, thus completely preventing tunnelling. By placing the rotating soaper in front of the first soap box, the distance which the rod travels through the lubrication is about treble that of the average sized soap box thus ensuring adequate pick-up of lubricant.

★ ★ ★

Earlier reference has been made to the effects of the speed of the first block, and as far as lubrication of the rod before it enters the first die is concerned, it is of the utmost importance that the rod does not pass too rapidly through the lubricant, otherwise pick-up of the lubricant is likely to be reduced, and trouble will be experienced in the drawing. After much experimenting a block speed of 200 F.P.M. for the first pass was found to yield the best results. From experience gained in these experiments it would appear that any greater speeds would necessitate a lengthening of the soap box used in conjunction with the rotating soaper, in order to ensure an effective lubrication.

★ ★ ★

As a matter of interest, the lubricating arrangement described was tried on two machines, one having a first block speed of 190 F.P.M., and the other 320 F.P.M. On both machines rods from the same cast were drawn the same reduction of area, and on the faster machine wire breakages in drawing were much more frequent and the die life was considerably less.

PART II

Drawing of Mechanical Descaled Rods

Preparation of Rods

When dealing with rods for descaling, a number of the old ideas have to be abandoned. The idea about rods cleaning better if they have been left to weather does not apply in the case of mechanical descaling because whilst the descaling machine will remove scale, it will not remove rust. If the rod has been weathered and become rusty, much of the rust will be drawn into the wire at the first pass.

★ ★ ★

Rods are better if they have aged (and I do not mean weathered) because then the scale is much more easily cracked off and the fine scale dust is removed without difficulty. The rods must however be kept perfectly dry because if they are at all damp the scale dust adheres to the rod and cannot be removed by the rotating brushes. It has been found that rods descale better and produce a better finished wire when they have been standing in the wire-drawing department for a period of some 48 hours, thus being brought to about the room temperature. It has also been found that with the rod being dry, the lubricant adheres more readily to the rod when being drawn. The need to dry rods could be avoided if rods were sheeted over during transit, but this is not a popular idea with the transport people who no doubt have in mind the risk of damage to their sheets by rod ends and tie bands.

★ ★ ★

When there is a shortage of rods, and they have to be descaled and drawn as soon as possible after receipt, there is often insufficient time to allow them to dry out steadily; then it is necessary to resort to the drying oven or flash baker, but unfortunately rods dried by this method do not draw as well as when they have been allowed to age slightly. It has been repeatedly experienced that when

drawing descaled rods which have not had time to age, the finished wire has a dappled surface finish, which is not present when rods from the same cast have been allowed time to age (about 48—72 hours). It is rather interesting to note that rods from different rolling mills descale in different ways —some rods scaling in large flakes while others have a much finer scale. It remains to be seen whether this factor has any significant effect on descaling.

Lubricants

When drawing an acid cleaned and coated rod at the first pass, the coat applied assists in the pick-up of the lubricant which is carried forward to the first die. The coat—whether borax, sull or metallic—is of a sort non-abrasive nature, and in the process of being drawn forms a cushion between the rod and the die surface; as the rod is drawn through the die the soap lubricant which it carries is partially melted into a plastic form by the heat and pressure set up in the die and is pressed onto the rod, so that a film of lubricant is formed around the rod as it is being drawn. This film, combined with the soft coat, reduces friction within the die and so gives it a longer life, and of course minimizes scraping of the rod.

★ ★ ★

With mechanically descaled rod the position became entirely different; since the descaled rod was completely without coat the lubricant to be used assumed even greater importance than formerly, as it would have to perform the dual function of coat and lubricant.

★ ★ ★

In the first place trials were made with the wiredrawers sodium soap in powder and cube form. That these trials were not successful was put down to an insufficiently high melting point and a lack of a suitable carrier agent required to assist in forming the coat.

★ ★ ★

The answer was finally found in a lime based soap which has a very high melting point and an ability to adhere to the rough surface of descaled rods. These qualities make it possible to produce on the descaled rod at the first pass a drawing coat comparable to that obtained by the combination of a sull or borax coat and normal soap lubrication as applied to acid cleaned rods. Lime base soap in granulated form is found to be much better than powder because the coarser particles reduce tunnelling in the soap box, and so ensure a much more uniform and consistent lubrication.

★ ★ ★

There is no doubt still much room for the further development of lubricants for use in connection with mechanical descaling, and it is considered that it would be very good if the lubricant manufacturers were to issue more information on this subject, as they do in the U.S.A.

Drawing

In the drawing of mechanically descaled rods the fundamental principles of wiredrawing remain unaltered. Since the descaled rod is devoid of any drawing coat the ever important matter of lubrication becomes even more important, but providing due regard is paid to this point there is nothing unusual about the method. It may well be hard for an apprentice trained wiredrawer of the old school to accept this viewpoint, but it is nevertheless perfectly true. Many people seem to imagine that the drawing of mechanically descaled rod is a one-pass operation—this however is far from being the case; this method lends itself to continuous drawing every bit as much as acid cleaning and coating, providing that the necessary attention is paid to the first pass, which is of course a key point in any continuous drawing.

★ ★ ★

Having determined the best type of lubricant for the purpose it is necessary to ensure that sufficient is picked up by the rod. As previously explained this was achieved by extending the actual run through lubricant from some 10″ to 30″ by adding a rotating soaper in front of the original soap box. The rod travels first through the rotating soaper and then through the original soap box before entering the first die, this length of 30″ travel through the soap, plus the circular movement of the rod effected by the rotating soaper, is sufficient to ensure a heavy pick-up of lubricant on the rod. Although granular lubricant is used the movement of the rod tends to rub it into powder form and thus the pick up can be seen to be a heavy covering of soap powder which is white in colour. This was not found to be so when the rod only passed through the original soap box nor when the box was extended; only by a combination of extended length of run through the lubricant and rotation of the rod in the lubricant were satisfactory results obtained.

★ ★ ★

At one stage experiments were made with a tube extending from the exit of the rotating soaper, through the open soap box to the die entrance; the rod passing first through the rotating soaper and then through the tube to the die, carrying the soap lubricant with it. Good lubrication was obtained by this method but the build-up of pressure of the soap in the tube was such that whenever the first block had been stopped the rod broke at the die upon restarting.

★ ★ ★

Experiments were also tried with an open tube in the soap box and the rotating soaper omitted. In this case tunnelling occurred in the lubricant, and due to the rod line being taut very little lubricant was picked up. This resulted in scraping of the rod, very poor die life, and even cracking of dies in some cases.

★ ★ ★

Although these attempts to pressure lubricate with the aid of a tube in the lubricant were not successful, it was in fact found that when drawing without a tube the desired effect was being achieved in a small degree by

compression of the carried forward lubricant in the conical entrance to the set screw. The compression is very limited because the mouth of the set screw is in the open box, thus affording ready release of back pressure.

★ ★ ★

Despite the heavy lubricant coat which is applied in this method of wiredrawing the consumption of lubricant is far from excessive. In actual practice, with a machine in production, it is only necessary to top up the lubricant in the rotating soaper—the level in the soap box immediately following the rotating soaper is maintained by soap carried forward by the rod.

★ ★ ★

As the movement of the rotating rod rubs the granulated soap into powder the topping up is as much necessary to reintroduce a granular content as to maintain a given level. Should the soap in the rotator become too powdered, lubrication can be impaired; as a safeguard against this a simple but very effective test has been established—a handful of soap squeezed in the palm of the hand should cling together, and if it does not this is a sound indication that some fresh soap is required in the hopper.

★ ★ ★

In addition to the lubricant which adheres to the wire emerging from the first die, there is also a considerable amount of excess soap which, having passed through the die on the surface of the rod, falls free in the form of flakes. Although this has been subjected to great pressure and heat it is not burnt or charred, and may be fed back into the hopper to serve again as a lubricant—thus wastage is very small indeed.

★ ★ ★

When the wire emerges from the first die it is of quite a dark colour, this being due to the oxide skin which remains on the rod after descaling and on top of which the lubricant coat has been formed. Experience has shown that when this oxide skin is broken, due to the rod rubbing against some obstruction before entering the die, bright streaks may be seen on the wire after the first pass and there is every possibility that lubrication failure will occur, giving rise to drawing difficulties on subsequent passes. For that reason I do not favour the practice of running the descaled rod through card clothing prior to the lubricant. There is always the risk of breaking the oxide skin, and in any case if the descaler brushes are correctly set the fine powdery scale should be removed without recourse to card clothing.

★ ★ ★

After descaled rods have been efficiently lubricated at the first pass of a continuous machine it is possible to draw through subsequent passes without any further lubrication. It is my belief however that lubrication at each pass is well worthwhile for the increased die life obtained; for this purpose the powdered lubricant which has worked forward from the rotating soaper to the open soap box is found to be ideal. Whether or not lubricant is applied subsequent to the first pass, it is vital that the wire entering each die is carefully aligned otherwise the soap coat will be displaced and scraping of the wire will result.

★ ★ ★

Much has been written about dies for drawing mechanically descaled rods; various pellet sizes and drawing angles have been recommended, and even a die with a double parallel has been advocated. In our case the use of special dies was not found to be necessary; we were already using No. 5 pellets with an angle of 12° for drawing acid cleaned rods and these were proved to be completely satisfactory for the drawing also of mechanically descaled rods. Where it is not possible to keep a machine on mechanical descaling all the time the use of standard type dies can be of a very considerable advantage in reducing down time when changing jobs. For instance, if a machine is drawing a finishing size of .060" in 5 passes from acid cleaned rods and the next job is for .060" in 5 passes from mechanically descaled rods, it is possible—with an adjustment of the revolving brushes in the descaling unit—to weld the two rods together and carry on producing without any loss of production. Now if special dies were used in the case of mechanical descaling production would have to be stopped whilst dies were being changed and the machine thread up again. This would also apply in reverse, that is to say, when changing from mechanical descaling to a similar job requiring acid cleaned rods or, for that matter, copper coated rods.

★ ★ ★

It is impossible for me to quote the life of any die, because I am not in a position to run any die to destruction, but the reports from the die room staff indicate that the dies when used for mechanical descaling compare very favourably, in both condition and die life, to when they are for drawing acid cleaned material.

★ ★ ★

In practically every case when a die has cracked it has been found to be due to a breakdown of the lubrication in the first pass due to the occurrence of tunnelling. If machine operators are properly trained in mechanical descaling they can increase die life by seeing that the lubrication does not tunnel, that the wire enters the die straight and that the revolving brushes on the descaling unit are correctly adjusted.

★ ★ ★

For those interested in production figures, the average machine efficiency taken over a period of 3 years—drawing .08/.13% carbon content mechanically descaled rods to finishing sizes of .080" to .060" in 5 passes has worked out at 90%. The first pass was in most cases from 5G to between .170" and .175". The weight of rod used was 340/350 lbs. and the finishing coil weight about 140 lbs.

★ ★ ★

Wire so produced is quite commonly drawn a further 6 passes to .028" with very good drawing performance, and is occasionally drawn as far as .022".

(*Please turn to page* 343)

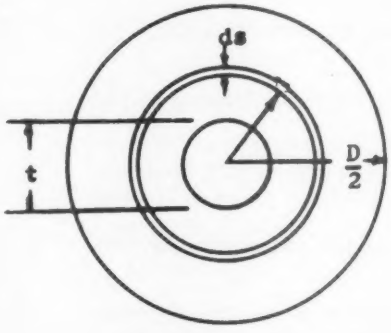
Dielectric Stress in Thin Walled Cable

by Sam Kalifon
Product Engineer
Hatfield Wire & Cable Div.
Continental Copper & Steel Industries, Inc.
Hillside, New Jersey

The common misconception prevails that the strength of an insulated conductor in resisting potential breakdown is dependent exclusively on insulation thickness. One speaks, for example, of the dielectric strength of polyvinylchloride as being the product of some stated number of volts per mil and its thickness. Thus, if the breakdown factor is 100, the dielectric strength of a 4/64" thick annulus of insulation is construed to be somewhat over 6000 volts. The principle is in error, however, as will presently become apparent.

★ ★ ★

Consider the following schematic cross-section of an insulated conductor.



For the layer ds at a distance S from the center of the conductor, the elemental resistance, dr, is

$$dr = k(L/a),$$

where

dr = elemental resistance, ohms
k = dielectric resistivity
L = length of path of current flow
a = cross-sectional area of path of current flow

Sam Kalifon

The author received a degree of Bachelor in Chemical Engineering in 1943 from the Cooper Union Night School of Engineering. He has since worked in the field of electrical wire and cable. He is an associate member of the American Institute of Electrical Engineers, The Wire Association and other societies.

The theoretical implications in the mathematical formulae, Mr. Kalifon states, are practical ones that are used constantly in connection with the testing done in his company's plant.

however

$$L = ds$$

and

$$a = 2\pi S$$

so that upon substituting it is found that

$$dr = kds/2\pi S$$

By integrating

$$r = (k/2\pi) \int_{t/2}^{D/2} ds/s$$

$$= (k/2\pi) \log_e D/t$$

★ ★ ★

This, then, is the equation of resistance to current flow through the dielectric and we proceed to find the expression for the current itself.

Since

$$I = E/R$$

and

$$R = (k/2\pi \log_e (D/t)$$

it follows that

$$I = 2\pi E/K (\log_e D/t)^{-1}$$

★ ★ ★

Now, the voltage drop across a thin wall of annular dielectric is given by the differential equation.

$$dV = Idr$$

but

$$dr = kds/2\pi S$$

whence

$$dV = Ikds/2\pi S$$

also

$$I = (2\pi E/k) \quad (\log_e D/t)^{-1}$$

so that

$$dV = (2\pi E/k)(\log_e D/t)^{-1}(kds/2\pi S)$$
$$= E(\log_e D/t)^{-1} \quad (dS/S)$$

Accordingly, Dielectric Stress =
$$(dV/dS) = (1/S)E(\log_e D/t)^{-1}$$

★ ★ ★

In words, then, the dielectric stress at a distance S from the geometrical center of the metallic conductor is directly proportional to the applied voltage, and inversely proportional to the napierian logarithm of the ratio of dielectric and copper diameters.

★ ★ ★

For small insulated conductors, therefore, the dielectric stress increases without bound as D/t approaches unity so that the application of even a modest potential can result in a violently disruptive dielectric stress across a thin wall.

Meetings Scheduled for 1958 By THE WIRE ASSOCIATION

The Regional Meetings and the Annual Convention listed below are conducted by and for production men of the Wire Industry. It is in your interests that the programs have been devised. Please try to attend them.

REGIONAL MEETING: Buffalo, N. Y., May 1 and 2 at the Statler Hotel.

Fred A. Webber, Chief Metallurgist, Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., is the General Chairman for this meeting.

The chairman of the Electric Wire and Cable Section for this meeting is W. R. Moyers, Chief, Wire Engineering Dept., Western Electric Co., Buffalo, N. Y.

Plant inspection tours of the Wickwire Spencer Wire Mill for the Ferrous Division and of Western Electric Company's Wire and Cable Plant for the Non-Ferrous Division, have been arranged.

REGIONAL MEETING: Los Angeles, Calif., June 5 and 6, at the Statler Hotel.

The program includes plant inspection tours and technical sessions, details to be announced later.

Joseph F. Conlan, President of the City Iron and Wire Works, Los Angeles, is the General Chairman for this meeting.

ANNUAL CONVENTION: Atlantic City, N. J., October 13-16, at Hotel Haddon Hall.

General Program Chairman will be Raymond S. Worth, Manufacturing Manager, Wire Mills Division, John A. Roebling's Sons Corp., Trenton, N. J. Chairmen of the Program Committees for the Convention will be:

Ferrous Division Chairman: Dartrey Lewis, Chief Engineer, Research and Development, John A. Roebling's Sons Corp., Trenton, N. J.

Non-Ferrous Division Chairman: Hugo W. Biskeborn, Director of Manufacturing, Ansonia Wire & Cable Co., Ashton, R. I.

Electric Wire & Cable Section Chairman: C. C. Lawson, Plant Facilities Engineer, Bell Telephone Laboratories, Inc., Murray Hill, N. J.

Visits to Roebling's Steel Wire Mill and Electric Wire and Cable Plants will be made, where much new equipment has been added since the Trenton Regional Meeting in 1953.

Papers delivered at these meetings will be prepared and presented principally by production men in the mills.

You are cordially invited to attend any or all of these meetings. You can broaden your contacts and exchange ideas on your own problems through personal meetings with others—as well as secure valuable information from the technical papers and the discussions that follow them.

THE WIRE ASSOCIATION

RICHARD E. BROWN, Executive Secretary

453 MAIN STREET **STAMFORD, CONNECTICUT**

Plan Now To Attend The Regional Meeting

of

THE WIRE ASSOCIATION

at the Statler Hotel, BUFFALO, N. Y., on May 1 and 2, 1958

o

The Program Will Include Papers on

- **The Development of Aluminum Clad Copper Magnet Wire.**
- **Compaction of Cabled Conductors.**
- **Application Aspects of Wire Mesh Welding.**
- **New Ideas in Patenting Furnaces.**
- **How New Products Are Developed.**

•• **And other papers to be announced in April, not yet confirmed.**

The banquet on Thursday evening will feature a timely and highly interesting talk on jet propulsion missiles.

On Friday morning, leaving the hotel at 9:30 A.M. will be two plant inspection tours. One will be to C.F. & I.'s Wickwire Spencer Steel Division's modernized wire mills. The other will be to Western Electric Company's electric wire plant. All busses will return to the hotel around noon.

o

General Program Chairman

FRED A. WEBBER, Chief Metallurgist
Wickwire Spencer Steel Div.
Colorado Fuel and Iron Corp.
Buffalo, N. Y.

Ferrous Program Committee

WILLIAM R. COOK, Wire Mill Supt.
Wickwire Spencer Steel Div.
Colorado Fuel & Iron Corp.
Buffalo, N. Y.

FREDERICK C. THOMPSON
Stainless Steel Service Engineer
Allegheny Ludlum Steel Corp.
Dunkirk, N. Y.

CHARLES REARDON, Sales Mgr.
Madison Wire Company
Buffalo, N. Y.

Non-Ferrous Program Committee

W. R. MOYERS, Chief of
Wire Engineering Department
Western Electric Company
Buffalo, N. Y.

WILLIAM G. MILLER, Manager of
Copper Wire Department
Westinghouse Electric Corp
Buffalo, N. Y.

ARTHUR J. POPKIN, President
Paragon Wire & Cable Company
Buffalo, N. Y.

Hotel reservation cards will be mailed to Association Members.
Non-Members should write for them to be assured of hotel rooms.
All wire men are invited to attend this meeting.

THE WIRE ASSOCIATION

RICHARD E. BROWN, Executive Secretary

453 Main Street **Stamford, Conn.**

ASSOCIATION'S ELECTRIC WIRE AND CABLE SECTION

Takes Form as Development and Management Committee is Organized

The industry men who will direct and guide the policies of the Electric Wire and Cable Section consist of:

Chairman

HUGO W. BISKEBORN, Director of Manufacturing
Ansonia Wire & Cable Co.
Ashton, R. I.

Members

HAROLD W. ADAMS, Prod. Supvr.
Cable Div., Reynolds Metals Co.
Louisville, Ky.

DAVID BARR, Plant Eng.
National Electric Products Corp.
Ambridge, Pa.

GROVER W. BROWN, Mgr. Machinery Devel.
The Okonite Company
Passaic, N. J.

G. E. FORSBERG, Vice Pres.
Surprenant Manufacturing Co.
Clinton, Mass.

JAMES S. HIGGINS, Plt. Mgr.
Copper Div., Walker Brothers
Conshohocken, Pa.

R. W. HIGGINBOTTOM, Chf. Cable Eng.
Triangle Conduit & Cable Co.
New Brunswick, N. J.

ALEXANDER A. KERR, Supt.—Prodn.
Electrical Wire Division
John A. Roebling's Sons Corp.
Trenton, N. J.

CLEMENT C. LAWSON
Plant Facilities Engineer
Bell Telephone Laboratories, Inc.
Murray Hill, N. J.

ALFRED H. MacGILLIVRAY, Supt.
Collyer Insulated Wire Co.
Pawtucket, R. I.

URBAIN J. H. MALO, Technical Dir.
The Crescent Co., Inc.
Pawtucket, R. I.

W. R. MOYERS, Chief Eng.
Wire Engineering Dept.
Western Electric Co.
Buffalo, N. Y.

J. C. MURRAY, Jr., Vice Pres.
Crescent Insulated Wire & Cable Co.
Trenton, N. J.

D. M. SCHMID, President
Techalloy Co., Inc.
Rahns, Pa.

PHILIP H. SNYDER, Plant Mgr.
Wire and Cable Division
The Electric Auto-Lite Co.
Hazleton, Pa.

ROGER T. STAFFORD, Project Engineer
Kennecott Wire & Cable Co.
Phillipsdale (Rumford), R. I.

MARSHALL V. YOKELSON, Res. Met.
General Cable Corp.
Bayonne, N. J.

This Committee will formulate the policies to be followed and the objectives to be accomplished, instructing the Executive Secretary of the Association as to its wishes, so that the details of correspondence, promotion, etc. may be handled in the Association offices.

In general, the Wire and Cable Section will be concerned with production matters, especially geared to the needs of those production men and engineers who are working on the production of Electric Wire and Cable.

You will be kept advised from time to time of the Committee's progress in this connection.

THE WIRE ASSOCIATION

RICHARD E. BROWN, *Executive Secretary*

453 MAIN STREET **STAMFORD, CONN.**

How to Save Money by Cold Heading Parts

A number of useful rules are set forth in this article by the engineers of a pioneer cold heading concern, the Russell, Burdsall and Ward Bolt and Nut Company of Port Chester, New York. Because the operation is fast and the products are accurately formed, the economy of this means of production has supplanted many machine tool operations.

Cold heading—a process that permits the fastener industry to produce a billion bolts and cap screws annually at low cost—is now replacing machining in the production of a multitude of threaded and unthreaded small metal parts. This is because cold heading produces a stronger piece at lower cost.

★ ★ ★

Cold heading flows and compresses steel fibers, making the bolt or other part stronger than the blank from which it is made. Because little or none of the material is cut away, there is little or no scrap loss. Unsound metal will open or distort when cold headed, so the process has built-in quality control. And because of the rapidity of cold heading machines, direct labor costs are reduced at least 25 per cent under those made by automatic machines that cut out parts.

★ ★ ★

Determining whether a piece may be more economically machined or cold headed requires no complex formulas. Almost any part that falls within the capacity of today's machines can be cold headed successfully. Good cold heading depends upon selection of proper material, design of punches, conditions of machines and the skill of the operator.

★ ★ ★

There are, however, useful rules of thumb that help determine the feasibility of cold heading and keep costs down. Here are some of the factors that should be kept in mind in deciding whether or not to have a product formed by a cold heading operation:

★ ★ ★

1. Maximum length of a cold headed part in today's machines is generally about six inches. Maximum diameter depends upon shape of the piece and location of the upset. For straight upsetting, a volume of material equal to 4½ diameters of the shank is about the limit. However, with transfer headers—using double extrusions and three blow headers or reheaders—26 diameters have been successfully controlled and upset.

★ ★ ★

2. Minimum number for an economical cold heading production run depends on design and, of course, the cost of alternative processing methods. Generally the cost of setting up can be paid off by the faster speed of cold heading in one day's run — about 25,000 pieces for a fairly large part.

★ ★ ★

3. A wide variety of metals can be worked by cold heading. Cold heading steel becomes more expensive as carbon content increases — especially, for complex shapes. It's best to limit carbon to 0.45. Many alloys are practical, including chrome nickel and chrome molybdenum. Non-ferrous metals, such as silicon bronze, Monel, brass and copper are all good cold upsetting materials. Certain stainless steels can be used, too. Materials which work harden rapidly are not practical for cold heading. Metallurgists in the industry can select a material for cold heading with almost any mechanical characteristics.

The range of components economically produced by cold heading at R B & W is broad. It's the same process by which bolts and cap screws are produced with mass economy.

★ ★ ★

4. Concentric formations are easier to handle than off-center or eccentric sections. However, many parts having eccentric cams, serrations or sections are produced successfully in cold heading machines.

★ ★ ★

5. Sharp corners are difficult to fill. Generous radii should be allowed if possible.

★ ★ ★

6. Oval or round shapes require less trimming than square or rectangular shapes because the upset is usually made cylindrical in the header.

★ ★ ★

7. Hollow upsets cause more die maintenance and cracks tend to form around the edges of the recess.

★ ★ ★

8. Lettering or embossing is expensive.

★ ★ ★

9. Large sections with a flat underside are easier to remove from a die when there are concentric ridges on the underside.

★ ★ ★

10. Long sections are more likely to distort if subsequent heat treatment is required.

★ ★ ★

If the product is such that it can be formed within the limits of these broad generalizations, then the chances are that it would be economical to have it made by this process, especially if the quantities required warrant the employment of mass production methods.

★ ★ ★

The matter of quantity is particularly important where special heading or forming dies must be made, as this expense applied to small runs might be prohibitive, whereas on large runs their cost per unit of product becomes negligible.

ABSTRACTS

These abstracts are published through the courtesy and with the permission of the Industrial Diamond Information Bureau, 2 Charterhouse Street, London, E.C.1, England. Inquiries regarding them should be directed to the Bureau.

TESTS CARRIED OUT ON DIAMOND WIRE-DRAWING DIES. I

British Diamond Die Federation. Wire Ind 1957 Vol 24 (285) pp 831-835, 873 (Sep)

Comparative tests of diamond dies made in this country with those made elsewhere are reported, as well as an attempt to establish the causes of poor die performance and improve the design and specification of diamond dies. The investigations by the technical committee of the British Diamond Die Federation relate to copper wire drawing, but the findings of an independent stainless steel wire drawer are incorporated. No large variation in the amount of wire drawn to fixed tolerances by dies of the same maker was found. No significant differences between different die makes were revealed. Apart from the correlation between die polish and performance, no significant correlation between the results of visual and wire drawing tests exists. Die life is generally determined by too large ovality in the wire drawn. Anomalies may occur when the wire diameter suddenly decreases by 0.00005 in. and remains so for several working shifts. The 'figures of merit' (ie logarithm of weight of wire drawn per 0.00001 in. increase in average diameter) are the same as those already reported, ie 3.61 to 4.44 for the restricted tolerance tests and 3.38 to 4.70 for the full tolerance test. Recommendations to purchasers are to buy dies within limits of 0.00005 in. and nil of the nominal size and carefully polish to size for maximum service. Regular plotting of the ovality of wires produced by each die is recommended as a guide to performance. 2 tables.

EXTREMELY SMALL PERMANENT MAGNETS

Anon. NBS Tech News Bull 1957 Vol 41 (11) pp 179-180 (Nov)

Cunife is an alloy of approximately 60% copper , 20% nickel and 20% iron with an unusual combination of magnetic and mechanical properties; instead of requiring casting or sintering into shape like most highly cohesive magnetic materials, it can be cold-drawn. It is possible to produce permanent magnets of Cunife as small as 0.005 in. in diameter by drawing larger sizes of the material through dies, even when the material is cold-worked to a point at which the magnetic properties are adversely affected, these can be restored by a simple heat treatment. 4 illustr.

DIE REFINING WITH BORON CARBIDE ABRASIVE

E. L. Anderson (Norton Co). Wire Ind 1957 Vol. 32 (9) pp 995, 1052 (Sep)

Diamond abrasive compounds are generally used to produce a high polish on sintered carbide and diamond dies, but boron carbide (Norbide) is increasingly used for ripping and semi-finishing sintered carbide dies. It does not cut as rapidly as diamond abrasive, but may be more profusely used because it is cheaper. It may be used with conventional die working equipment. For lapping it is applied with a brush or a stick. Various oil suspensions may be used. Sizes 220 to 240 are used for ripping dies, size 320F for semi-finishing, sizes 400, 500 and 600 mesh for the final finish. For drawing operations where finish matters less than size reduction, the die may be finished by boron carbide only. 3 illustr.

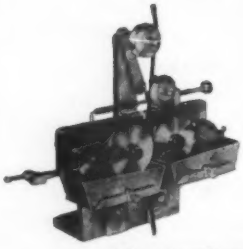
AN INSTRUMENT FOR THE MEASUREMENT OF THIN WIRES. Geraet zum Messen duenner Draehte

M. I. Krysanov. Stanki i Instr 1956 Vol 27 (3) pp 33-34 Feingeraetetechnik 1957 Vol 6 (11) pp 525-526 (Nov) (In German —original in Russian)

A pneumatic instrument is described with which the diameter and shape of the cross-section of wires not less than 0.02 mm diameter can be measured during manufacture to within an accuracy of 3 micron. I illustr, 1 ref.

THE SUPPLY OF ABRASIVES DURING THE OPENING UP OF CARBIDE DIES. Die Schleifmittelzufuehrung beim Aufstossen von Hartmetallziehsteinen.

ANNOUNCEMENT



DUNCAN M. GILLIES CO., INC.

announces the appointment of the

E. V. Larson Co., Ltd.

of Toronto, Ontario

as their Canadian Representative

The territory includes all of Canada for the entire line of DUAL PRINTERS, SINGLE PRINTERS, HEAVY DUTY and EXTRA LARGE PRINTERS as well as the GILLIES CONCAVE and FLAT MARKING WHEELS

All inquiries in CANADA should be addressed to

MR. E. V. LARSON, *President*
The E. V. Larson Co., Ltd.
572 Queen Street East, Toronto 2, Ontario
Telephone: EMpire 4-2111

"There is no substitute for QUALITY when combined with SERVICE!"

DUNCAN M. GILLIES CO., INC. **POST OFFICE BOX 181 WEST BOYLSTON, MASS.**

Telephone: West Boylston TE 5-4445

R. Bruehl. Stahl & Eisen 1957 Vol 77 (20) pp 1384-1385 (Oct 3) (In German)

For opening up die holes of less than 0.5 mm, diamond paste of medium to fine grains is used. The paste can be obtained by sedimentation and decanting of a suspension of 1 carat of diamond in 20 cc of olive oil. The graded paste is thickened by the addition of vaseline or beeswax, 10 cc of vaseline being added to 1 carat of diamond, and can then be applied directly to the steel needle since, for the very fine die hole, constant supervision of the process is required in any case. At larger diameters the aperture is best covered with a funnel-shaped metal cap containing a reservoir of paste. For die holes of diameters above 0.5 mm, boron carbide or silicon carbide is used as abrasive and special devices for assuring a continuous supply of abrasive are described. 4 illustr.

THE FUNCTION OF ADDITIVES IN TUNGSTEN FOR FILAMENTS

J. L. Meijering, G. D. Rieck, Philips Techn Rev 1957 Vol 19 (4) pp 109-117 (Oct 16)

Tungsten wire for the filaments of incandescent lamps is made from sintered tungsten bars by swaging and drawing, wire of the smallest diameter being drawn through diamond dies. It is common practice to use additives to avoid sagging or off-setting in the drawn wire. The role of these additives is considered and some experiments are described. 9 illustr, 13 ref.

QUALITY CONTROL IN WIRE DRAWING SHOPS. Qualitaetsueberwachung in Drahtziehereien.

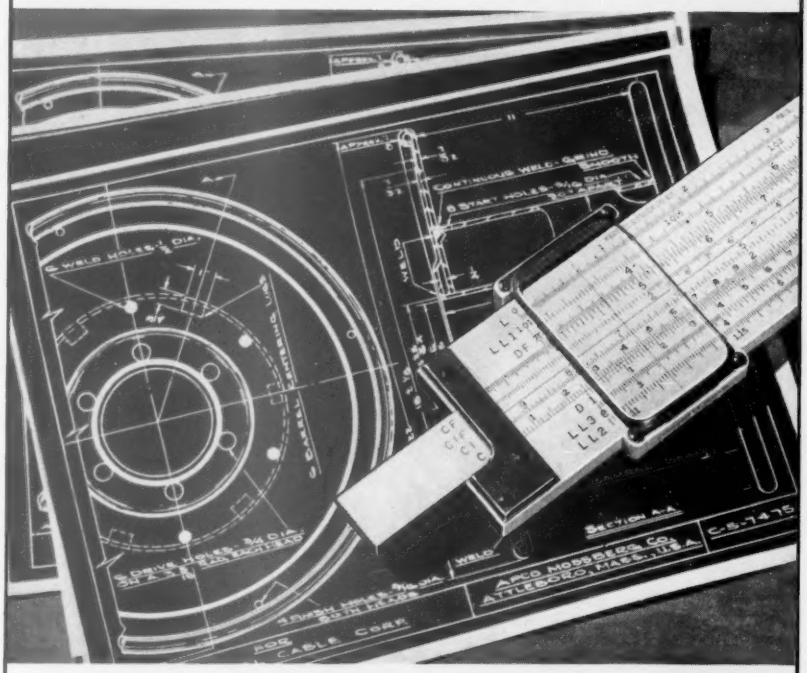
W. Puengel. Ind-Anzeig 1957 Vol 79 (82) pp 1242-1243 (Oct 11) (In German)

General article listing some of the properties of wires which should be tested, eg metallographic structure, tensile and bending strength. 4 illustr.

American and German Spring Coiler Makers Make Exchange Agreement

A manufacturing and sales agreement for exchange of complete machine designs has been negotiated by **The Torrington Manufacturing Company,** Torrington, Conn., and **Meyer, Roth & Pastor of Koln-Raderberg** (Cologne), Germany. Torrington, producer of spring coiling machinery, will make and market M. R. & P.'s vertical wire-forming machines in five sizes in the U.S. and Canada. The German firm, in the wire-forming field since 1870 and a leading four-slide manufacturer, will produce and sell Torrington Manufacturing's spring-coiling ma-

If you draw wire . . .



DRAW ON APCO MOSSBERG

for engineered reels, spools and bobbins

A wealth of experience — gained through more than 50 years of service to wire and wire rope manufacturers — makes Apco Mossberg well qualified to fill your complete requirements for steel reels, spools and bobbins.

The full-time staff of Apco Engineers, teamed with skilled craftsmen and modern production facilities, is ready at all times to bring you custom-made units in all sizes and designs. Their practical solutions to wire and wire rope handling problems often produce immediate and substantial production and shipping savings.

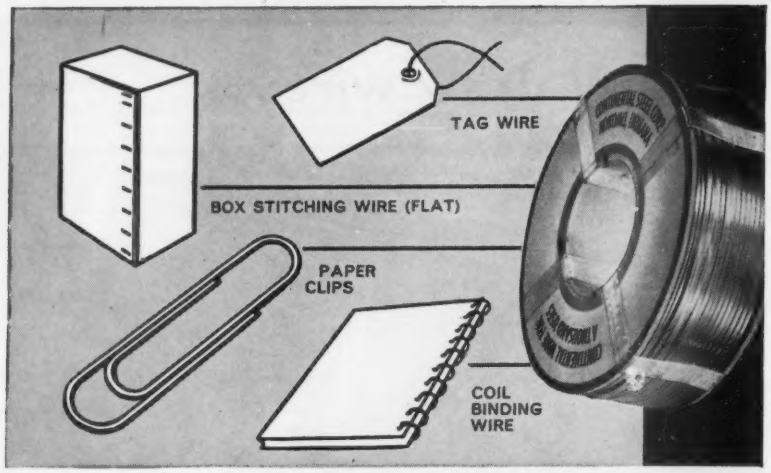
For preliminary recommendations, at no obligation, write, wire or phone Attleboro 1-0340 collect today.

Pacific Coast Representative:
Gordon Proffitt
World Trade Center
Ferry Building
San Francisco 11, California

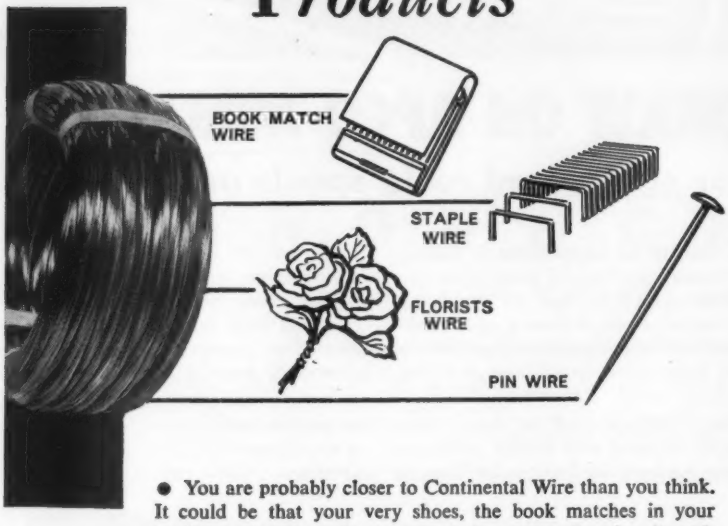
Canadian Representative:
Hugh P. Williams & Co.
47 Colburne Street, West
Toronto, Ontario, Canada

APCO MOSSBERG COMPANY

LAMB STREET, ATTLEBORO, MASSACHUSETTS



Fine and Specialty Wire for Super Fine Products



● You are probably closer to Continental Wire than you think. It could be that your very shoes, the book matches in your pocket or the paper clips in your desk—were made using dependable Continental Fine Wire! That's because Continental is preferred by hundreds of leading firms for literally thousands of different fine wire applications. For super fine products—you, too, should try Continental Fine and Specialty Wire, available in many sizes, of almost any temper, finish or analysis, in low carbon and medium low carbon steels.

For the finest in fine wire—call in Continental!

CONTINENTAL

STEEL CORPORATION • KOKOMO, INDIANA

Wire Specialists for over half a Century

PRODUCERS OF: Manufacturers' Wire in many sizes, tempers, and finishes, including Galvanized, KOKOTE, Flame-Sealed, Coppered, Tinned, Annealed, Liquor Finished, Bright, and special shaped wire. Also Welded Wire Reinforcing Fabric, Nails, Continental Chain Link Fence, and other products.

chinery in Europe.

★ ★ ★

The M. R. & P. machines will be available in five sizes in ranges most commonly used in the metalworking industry and will be produced by Torrington specifically for U.S. and Canadian markets. Torrington's own recently announced Verti-Slide all-purpose vertical four-slide machine, designed primarily for strip, will be complemented by the M. R. & P. UB machines, which are used essentially for wire, although having some strip capacity. Torrington's engineering and service facilities will be provided for the German machines.

New Insulations Developed

Development of two new types of Epoxy-saturated Quinterra electrical insulations for Class "B" applications is announced by **Johns-Manville Corporation.** These products have a highly purified asbestos base that gives them unique electrical and thermal properties.

★ ★ ★

Known as types 71 and 72 Quinterra, they combine the thermal stability and lasting dielectric strength of the Quinterra base sheet (Type 1) and the excellent electrical properties of Epoxy resin.

★ ★ ★

Type 71 Quinterra is a high resin content product (approximately 45-50%) with superior electrical properties. Laboratory tests indicate a dielectric strength of over 700 volts per mil, high tensile strength and a moisture absorption factor (24 hour immersion) of less than 2%. After thermal aging at 175C (considerably above the Class "B" maximum of 130C), it shows a good retention of properties. Available in finished thicknesses of 4 and 5 mils, as tape, cut sheets or rolls up to 36″ wide.

★ ★ ★

Type 72 Quinterra is a normal resin content product (approximately 20-30%) with good electrical properties. After thermal

aging at 175C, it shows lasting electrical values. Tests indicate that in some cases dielectric strength increases after exposure to temperature and/or humidity. Available in nominal thicknesses of 3, 4, 6 and 9 mils. Supplied in tapes, cut sheets, and rolls up to 36″ wide.

★ ★ ★

Complete details are contained in pamphlet EL-95A, available from Johns-Manville Corporation, 22 East 40 St., New York, N. Y.

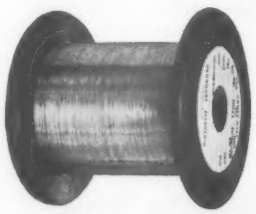
New High Temp Hook-Up Wire

A completely new method for insulating High Temperature Miniature Wire and Cable has been developed by **Tensolite Insulated Wire Co., Inc.** Known by the trade name of Flexolon, and made according to an exclusive Tensolite process, the new wire embodies all of the outstanding physical and electrical characteristics provided by other methods of Teflon insulating. The most significant feature of Flexolon wire is Color Guard Striping, in which the stripe, clearly visible and identifiable, is protected by a thin layer of highly abrasion-resistant Teflon. Minimum continuous lengths of 250 feet are guaranteed; with average production lengths running between 750 and 1000 feet. Higher abrasion and cut-through resistance, extra flexibility, high dielectric strength, and maximum ease of stripping are factors making Flexolon the most versatile high-temperature electronic hook-up and lead wire available today. The wire is made in conformance to and in many instances exceeds, the requirements of Mil-W-16878B for Hook-up Wire. Thin wall and extra thin wall constructions providing the ultimate in flexibility are available to specifications. Information and samples may be obtained by writing to Tensolite Insulated Wire Co., Inc., 198 Main St., Tarrytown, N. Y.

New Bulletin on Straightening and Cutting Machines

The Lewis Machine Co., 3441 East 76th St., Cleveland 27, Ohio, has issued an illustrated bulletin

How Lestershire Bobbins save money for Wire Manufacturer and its customers



Because they take rough handling in shipment, are re-usable and weigh far less than metal bobbins, Lestershire Wire Bobbins cut costs and losses for both a magnetic wire manufacturer and its customers.

Withstand rough treatment. Extra dense Vulcanized Fibre bobbin heads prevent damage to wire or bobbins in transit. Where brittle, metal-bound wood heads chip easily, shock-absorbing Vulcanized Fibre heads resist chipping and denting. In fact, Vulcanized Fibre has *self-healing* properties; bumps "iron themselves out" to the original, smooth, hard finish.

Last indefinitely. Lestershire patented anchor screw construction gives extra ruggedness to the head-barrel joint. Added strength in materials and construction means that Lestershire Wire Bobbins wear indefinitely. You can use them over and over again—and save the cost of frequent replacements.

Save shipping charges. Vulcanized Fibre weighs less than half as much as aluminum. The light weight of Lestershire Bobbins means big savings in shipping.

Send for free details. For full information on the Lestershire Line of Wire Bobbins, get our 12-page comprehensive Bobbin Manual. Write for your free copy direct to: Dept. GG-3.

LESTERSHIRE SPOOL DIVISION
NATIONAL VULCANIZED FIBRE CO.
WILMINGTON 99, DELAWARE • *In Canada:* NATIONAL FIBRE COMPANY OF CANADA, LTD., Toronto 3, Ontario

The growth and reputation of Carris Reels have been built on a solid foundation of these basic principles: conscientious attention to detail . . . fine workmanship . . . a thorough knowledge of the reel and spool business . . . very prompt delivery of orders . . . and a consistent policy of very reasonable prices.

These principles, and our adherence to them, are responsible for our enviable reputation among the country's foremost users of spools and reels, many of whom we count among our customers.

Find out how you can also benefit from using our products! Contact us today for full details!

WE MAKE OUR OWN PLYWOOD TO GIVE YOU EVEN BETTER SPOOLS AND REELS

CARRIS REELS
INCORPORATED
RUTLAND, VERMONT
SPECIALISTS IN THE DESIGN AND MANUFACTURE OF PLYWOOD REELS AND SPOOLS

describing their 2CV4 and 2CV5 straightening and cutting machines, which are automatic, high production machines for 1/16" to ¼" diameter and 1/16" to 5/16" diameter respectively.

★ ★ ★

Accuracy can be held to tolerances of .0025" and speeds up to 200 f.p.m. are obtainable through a variable speed control. Round, flat or hex wires can be accommodated. The 2CV-SC machine, especially made for short lengths, produces lengths of ½" to 6".

★ ★ ★

An outstanding feature of the 2CV series is the Dual-Center Straightening Arbor, which makes it possible to precision straighten small diameter wires. Other models are available to handle .012" to 1" diameter round wires as well as shapes.

★ ★ ★

Write for Bulletin No. 2CV4-58.

New Aluminum Wire Has Higher Conductivity

A major technological advance, enabling the electrical industry to effect greater economies in future operations, has been announced by **Aluminum Company of America.** Aluminum conductors with a minimum conductivity of 62 per cent but without reduction in tensile strength are now available at no additional cost to Alcoa customers.

★ ★ ★

The present industry standard for minimum conductivity is 61 per cent I.A.C.S. The one percentage point increase, an Alcoa first, will enable engineers in many instances to make cost-savings of as much as 2 cents per pound.

★ ★ ★

The new measure, available in redraw rod as well as in EC grade conductor, is the result of carefully controlled production. According to **P. T. Coffin,** manager of eletrical industry sales, 62 per cent conductivity metal has been included in most shipments of redraw rod and conductor for several months prior to this announcement.

Ansonia Announces Alpeth-Type Cables

Production of Ankoseal Alpeth-type cables is geared for immediate deliveries, according to **Ansonia Wire & Cable Company,** "the oldest name in plastic cables in the most modern plant devoted entirely to producing plastic cables."

★ ★ ★

Newest product in the Ankoseal line of cables, the Alpeth-type innovation is shielded with low-resistance corrugated aluminum, longitudinally applied, which is said to assure greatly improved lightning protection and to reduce induction noise to minimum. Conductors are color coded, with the outer jacket and insulation of tough durable polyethylene.

★ ★ ★

Complete details on Ankoseal Alpeth-type cables are available from Ansonia Wire & Cable Company of Ashton, Rhode Island.

New Boron Mine and Refinery Dedicated

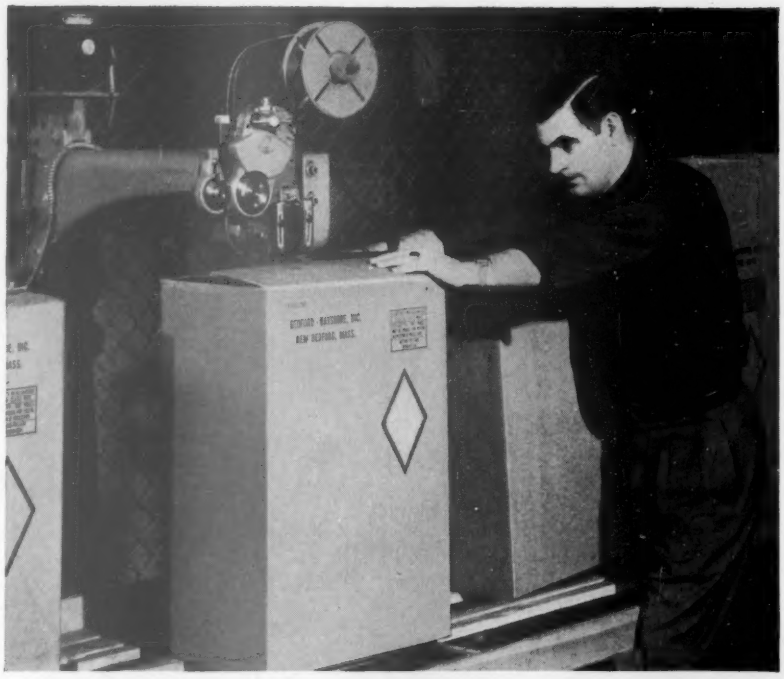
Adequate supply of boron to meet the needs of the entire free world for defense and industrial purposes through the next 100 years at the present rate of consumption was assured with the opening on Nov. 13, 1957, of **United States Borax & Chemical Corporation's** new $20,000,000 open pit mine and refinery.

★ ★ ★

More than 70 per cent of the free world's supply of this industrially and scientifically important ore is located in a huge deposit at the site of the new plant in the Mojave Desert 130 miles northeast of Los Angeles. Full-scale mining of the ore commenced today with the formal dedication of the new facilities.

★ ★ ★

Boron is highly regarded as an important potential factor in national defense and missile development through its possible use as an essential ingredient in exotic high energy fuels. There also are



Prentiss box-stitching wire in this Bostitch stitcher makes short work of fastening.

PRENTISS BOX-STAY WIRE IS

FAST, STRONG, CLEAN

—COSTS LESS IN THE LONG RUN!

Here's why you can cut your fastening costs with Prentiss Wire, and actually save time and trouble in the bargain:

Clean and simple—Prentiss box-stay wire is clean, easy to work with. No special equipment is necessary to "quick dry" a wire closure!

Faster—Cartons are ready to use the moment they're stitched, without fear of seams pulling loose. You never tie up storage space as a drying area.

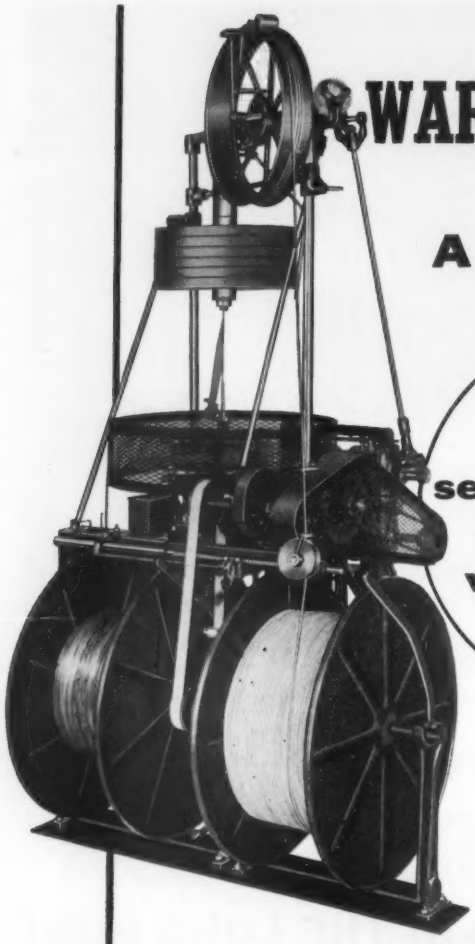
Stronger—With Prentiss wire, the full strength of the corrugated board is used, because stitches go all the way through the layers and flaps. Result is a strong, *secure* seal.

Easy opening—Wire-stitched cartons can be opened easily, without cutting top of the box off. Carton can be used for storage purposes when only part of the contents are removed at first opening.

Prentiss box-stitching wire saves money on special equipment, labor, storage space, time. Available coppered, tinned or galvanized in five, ten or 25 pound coils for use with Prentiss Detachable-Head Spools. Comes in variety of sizes. For free catalog of Prentiss Wire Products, and for the name of your nearest Prentiss representative, write, wire, or call collect, *Prentiss Wire Mills, Riverside-Alloy Metal Division, H. K. Porter Company, Inc., Holyoke, Mass.*

H. K. PORTER COMPANY, INC.

RIVERSIDE-ALLOY METAL DIVISION



WARDWELLIAN®

A C SERVER

New improved serving machine for applying various types of tapes

- Equipped with adjustable traverse, supply and windup stands, windup driving mechanism, electric stop-motion and capstan release mechanism.
- Adjustable for regulating lay of material.
- Rate of production dependent upon width of material and lay.
- Driving pulley 8″ diameter; 1 3/4″ belt.
- Capstan 18″ diameter, 3″ face.
- Opening through serving head 5/8″ diameter.
- Supply packages 16″ diameter, 3″ diameter core.
- Supply tube holds 8 reserve packages of 1″ wide material.
- Maximum power requirement 3/4 H.P.
- Motor drive furnished upon request at additional cost.
- Counter for measuring production in feet.
- Stands accommodate reels 30″ in diameter, with overall width up to 16 inches.
- Base plate supplied for bolting frame to floor to prevent vibration in machine.
- Reels not included with machine.

Note: Serving head normally runs clockwise, but can be made to run counter-clockwise if desired.

WARDWELL
BRAIDING MACHINE CO.
1212 HIGH STREET
CENTRAL FALLS
RHODE ISLAND, U. S. A.
Representatives for Europe, British Colonies and Dependencies
JAMES MACKIE & SONS, LTD., BELFAST, IRELAND

currently more than 100 different industrial uses of boron.

★ ★ ★

A symbolic final load of ore was hauled out of the mine by the famous 20 mule team which transported borax ore from the company's Death Valley mines in the early days of California history.

★ ★ ★

Then, as supersonic jets blazed through the skies overhead, President **James M. Gerstley** threw a switch setting off a tremendous blast deep in the 175-foot deep mine to signal the start of mining of borax by the open pit method for the first time.

"The Surface Story"

The caption is the title of a new 28-page brochure issued by **Surface Combustion Corporation,** Toledo 1, Ohio, in which is described the diversified activities of the company.

★ ★ ★

The brochure contains brief descriptions of the equipment engineered and built by the Surface Pelletizing Division, Steel Mill Division, Heat Treat Division, Glass Division, Webster Engineering Company—Boiler Burner Division, Kathabar Air Conditioning and Drying Division, Janitrol Aircraft Division and Janitrol Heating and Air Conditioning Division.

★ ★ ★

Please request your copy on your company stationery.

Miner Rubber of Canada Enters Tape Field

The Miner Rubber Co. Ltd. Granby, Quebec, and the **Peters Manufacturing Co.** of Wollaston, Mass., have announced an agreement whereby Miner will make all types of cable tape for the wire and cable industry of Canada.

★ ★ ★

The Peters Company, founded in 1898, a leader in the tape industry in the United States will supply the technical service.

★ ★ ★

The Miner Rubber Co. Ltd., one of the oldest rubber companies in Canada, is a leading manufacturer of rubber products. The Company's factories are excellently equipped with up-to-date machinery suitable for the production of all types of tapes required by the wire and cable industry. Modern laboratories provide excellent facilities for testing and evaluating new products.

★ ★ ★

The combined experience and technical skills of these two firms should prove of great value in serving the wire and cable industry of Canada.

Elgin to Expand Industrial Lines

Expansion of its industrial products line to include diamond mounted points and hones is announced by the Abrasives division of **Elgin National Watch Co.**, Elgin, Ill.

★ ★ ★

The new products are available from stock. Mounted points come in sizes ranging from 3/32 of an inch to 1 inch in diameter and the hones in standard sizes, with specials available.

★ ★ ★

A special blending process developed in the Elgin diamond laboratories controls concentration and uniform distribution of virgin diamond in the new resinoid-bonded tools, assuring rapid cutting and long-life performance.

★ ★ ★

Points are mounted on solid carbide shanks to provide maximum tool rigidity for greater grinding accuracy and efficiency in hardened steel and all carbide die finishing operations.

★ ★ ★

The Elgin Abrasives division also markets a wide line of solid carbide rotary tools, drills, reamers and end mills, as well as industrial diamond compound and Elgiloy spring alloy materials.

Get the habit of reading regularly
WIRE AND WIRE PRODUCTS
The Wire Man's Magazine

For High Tensile Strength, Specify

TEXTILENE GLASCOR*

Soft, dry fillers for portable and flexible cords, Textilene Glascor and Twi-Port have wide acceptance. Fiberglas-centered Glascor is exceptionally strong without added bulk or sacrifice of pliability. It goes into S, SJ, and SV cords with 18, 16, and 14 gauge conductors — Twi-Port into S and SJ cords with 12 gauge and larger conductors. Successful applications include control, appliance, and power cables; telephone drop wire; communications and coaxial cables.

Twitchell's superior Textilene line also includes: Fungus-resistant filler — *Twi-Tar*. Used for buried communications cable, expanded ACSR cable, and in other applications.

Moisture-resistant fillers—*Twi-Flex* and *Twi-Wax*. Used for nonmetallic sheathed cable, maritime shipboard cable, varnished cambric cable.

*Patent Applied For

For Every Wire and Cable Application
Twitchell's TEXTILENE Fillers Fill The Bill

Quality-controlled materials that are dependably uniform . . . in standard forms, or customized to special needs.

Initial low cost with savings added by production efficiency . . . flexible, ready-to-use fillers that fit all equipment, handle and form easily, always maintain desired shape.

Assured supply from a reliable domestic source . . . always available in economical and convenient packaging.

Proved performance as components of cables and wires that meet government specifications . . . stability shown by trouble-free installations in continuous service 20 years and longer.

FREE — SAMPLE SPOOLS of any type of Textilene filler to demonstrate the superiority of Twitchell materials in your operation—also technical counsel without cost or obligation. Just tell Twitchell your end-use requirements. *Write, wire, or phone today:*

E.W. TWITCHELL INC.

Third and Somerset Streets, Philadelphia 33, Pa. • REgent 9-7800

PAPER PRODUCTS FOR THE WIRE INDUSTRY
Twisted • Folded • Pressed • Crushed • Shaped • Braided • Woven

Outstanding Personalities of the Wire Industry

Appointed Plant Manager

The Gary Screw and Bolt Division of **Pittsburgh Screw and Bolt Corp.**, Gary, Ind., has announced the appointment of **Nick E. Staresina** as Plant Manager. He comes to them from the **Lamson & Sessions Co.**, where he has been for the last 28 years.

Gavitt Elects New Officers

Budd E. Pollak has been elected president, and **Richard P. Houlihan** vice-president, of **Gavitt Wire & Cable Co.**, a division of Amerace Corp. Mr. Pollak retains his position as secretary of the parent company. Mr. Houlihan has been general manager of Gavitt.

Armco Promotes Four Men

The promotion of three research engineers by **Armco Steel Corporation** to senior research engineers and the advancement of a metallurgist to senior metallurgist was announced by **T. F. Olt**, Director of Armco Research.

* * *

The newly appointed engineers are **Hart F. Graff, Arthur P. Kerschbaum** and **Chester E. Ward. Elbert E. Denhard** is the new senior metallurgist. Graff, Kerschbaum and Ward are associated with Armco's Middletown laboratories. Denhard is on the Baltimore laboratories staff.

* * *

Mr. Denhard joined Rustless Iron and Steel Corporation in 1941, prior to the time it was acquired by Armco. He advanced to junior combustion engineer and assistant metallurgist. After Armco and Rustless consolidated, he was promoted to assistant research metallurgist, becoming a metallurgist in 1954.

Executive Changes at Wheelabrator

Two important top executive changes were made by **Wheelabrator Corporation** of Mishawaka, Ind., effective Janury 1, 1958.

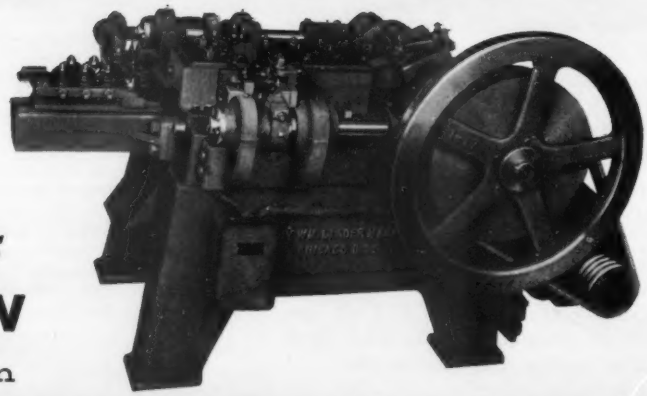
* * *

Otto A. Pfaff, chairman and president, retired as president and will continue as chairman of the board. James F. Connaughton, executive vice president, was elected president.

* * *

Mr. Pfaff has been with Wheelabrator since 1916 and served 22 years as general manager and 17 years as president and general manager. Under his direction, Wheelabrator has become the world's largest manufacturer of airless blast cleaning equipment

IF THERE'S A NAIL MACHINE IN YOUR Future make it a GLADER



11 SIZES OF MACHINES

AVAILABLE NOW

Write for 12 Page Bulletin

Wm. GLADER MACHINE WORKS 210 N. RACINE AVENUE CHICAGO 7, ILLINOIS

EXPORT DEPT. 122 EAST 42ND STREET • NEW YORK 17, N. Y.

and steel abrasives.

★ ★ ★

Mr. Connaughton resigned last June as president of American La-France Corporation to join Wheelabrator. He is a former vice president and general manager of the Eddystone Division of Baldwin-Lima-Hamilton.

Made Manager of Insulated Wire Plant

The appointment **of H. J. Stewart** as Manager of the York Works of the **Continental Wire Corporation** has been announced by **J. C. Schafer,** General Manager.

★ ★ ★

Mr. Stewart, a graduate of the Bliss Electrical School, has had broad experience in the Wire and Cable Industry, in which he has served for the last 25 years in product, engineering and management capacities.

★ ★ ★

Continental Wire manufactures a complete line of insulated wire and cable for the missile, aircraft, electronic and electrical manufacturing industries.

Elects Vice Presidents

Peters Manufacturing Co., Wollaston, Mass., has announced the election of **James J. Lowe** and **Charles A. Chabot** as Vice Presidents. Mr. Lowe, formerly Sales Manager of American Mfg. Co., Brooklyn, N. Y., will be in charge of marketing. Mr. Chabot, previously associated with American Steel & Wire Co., Worcester, Mass., will head up the Research and Development Division. The company is a leading producer of Tapes for the Electrical Cable Industry and also coated papers, films and fabrics.

Phelps Dodge Elects Officers

The election of **Edgar P. Dunlaevy** as executive vice president of **Phelps Dodge Copper Products Corporation** and **S. Allan Jacobs** as president of the concern's **Inca Manufacturing Division** in Fort Wayne, Ind., has been announced by the company. They also were made directors of the corporation.

★ ★ ★

John J. Conlon, William K. Dunbar, Jr. and **Earle A. Mitchell** were elevated to vice presidents at the meeting of the board of directors.

★ ★ ★

Charles F. Moody was named works manager of the Habirshaw Cable and Wire Division in Yonkers, N. Y., and **Lewis F. Buckman** is the new works manager of the Bayway Division in Elizabeth, N. J.

Crucible Promotes Matticks

Crucible Steel Company of America has announced the appointment of **Kenneth A. Matticks** to the newly-created position of Manager of Product Development —Stainless Steel Sales Division.

★ ★ ★

Mr. Matticks had been a Stain-

(ILLUSTRATED)
42" x 20" x 21"—(4000# cap.)

HEAVY DUTY
BREAK-DOWN REELS

1000#
2000#
4000#
} capacities

Rugged Design including patented DURA-CURL rim, and many other features necessary to provide the *Strength* and *Durability* needed for continued successful performance.

Also complete line of sizes of Modern High Speed Wire Drawing NO-CREV Spools and Reels for both fine and intermediate size wire.

Mossberg PRESSED STEEL Corporation
"Division of Wauskuck Co."
18 WEST ST., ATTLEBORO, MASS., U.S.A.

Telephone
Attleboro 1-0848

#103

less Contact Metallurgist in the Central Metallurgical Office. He will continue to maintain offices at Crucible headquarters in Pittsburgh.

★ ★ ★

In his new capacity, Mr. Matticks will direct activities designed to promote the development of new or improved stainless steel products, and will have responsibility for technical and other services to Crucible's stainless steel customers. He has been with Crucible since 1944, when he joined the Company's Park Works in Pittsburgh as a metallurgist.

To Represent U.S.I.

John K. Moffett, Jr. of U. S. Industrial Chemicals Co., Division of National Distillers and Chemical Corp. has been appointed Assistant Manager of Petrothene® Polyethylene Sales. The announcement was made by **A. R. Ludlow, Jr.,** Sales Vice President of U. S. I.

Mr. Moffett graduated in 1948 from Yale University and has been employed since then by U. S. I. He was Supervisor of the company's sodium peroxide plant, head of sodium peroxide sales and at the time of his new appointment Mr. Moffett was in a sales development position for Petrothene® polyethylene resins.

A. N. Gray Wins McGraw Award

Alvin N. Gray, Baltimore, Md., development engineer of **Western Electric Company,** received the Manufacturers Medal of the James H. McGraw Award for Electrical Men as a highlight of the general membership luncheon held during 31st Annual Meeting of NEMA.

★ ★ ★

The presentation was made by **A. F. Metz,** Passaic, N. J., chairman of the board of **The Okonite Company** and a past President of NEMA.

★ ★ ★

Mr. Gray received his award for development of a process for extruding rubber for insulating wire. Under the old method, the rubber compound was extruded hot, and it had to be fed into the extruding machines quickly, before it could vulcanize or cool. Mr. Gray devised a process in which the compound is handled and extruded at room temperature. More than 30 other companies have now adopted the process.

★ ★ ★

Twenty-six patents have been granted in his name during his career with the company, plus eight more granted jointly to him with others.

Carpenter Appointments

Four men have been appointed to staff positions in the metallurgical and operating departments of the **Carpenter Steel Company's** newly acquired subsidiary, **Carpenter Steel of New England, Inc.,** Bridgeport, Conn.

★ ★ ★

Walter A. Schlegel has been as-

Standardize on ACROPAK* Spools!

Only ½ the Weight!

YET STRONG, TOUGH, RIGID . . *LONGER LIFE*

ACROPAK Spools will help you cut wire packaging costs because they give longer service, require less maintenance and cost less to ship. They're strong. They'll take repeated shippings and still run true on the arbor. They're machined to close tolerances. You can run them at high production speeds with fewer snags, less toe-out and minimum end breakage.

THEY CUT YOUR SPOOLING COSTS

Best proof of ACROPAK superior performance are the millions of these spools now used by the biggest names in the wire industry. We've proved it to them—let us prove it to YOU.

- Light Weight
- Precision built
- Reduced cost
- Longer life
- Extra strength
- Dynamic balance
- Greater production
- Low cost reconditioning
- Less maintenance
- Attractive packaging

★ We also make a complete line of heavy-duty shop processing STEEL SPOOLS built to the same high standards of accuracy and rigidity as the famous Acropak aluminum spools.

ACROMETAL PRODUCTS INC.
616 5th Street North, Minneapolis 1, Minn.

signed as resident chief metallurgist, **Elmer Schwartz** has been appointed general superintendent of the production departments. **James MacMinn** is named superintendent of billet preparation, and **Joseph J. Barrett** becomes assistant superintendent of hot rolling.

Carpenter Promotes Metallurgist

The Carpenter Steel Co., Reading, Pa., has promoted **Joseph S. Pendleton, Jr.** from sales service metallurgist to metallurgist—tool and alloy steels.

★ ★ ★

Mr. Pendleton joined Carpenter on his graduation from Princeton University in 1939. He has been a sales service metallurgist for the past ten years. His experience also includes a course in ferrous metallurgy at Pennsylvania State University, which he completed in 1941, and service in the U. S. Army from 1941-1945.

Soracco Advanced by Bethlehem Pacific

L. J. Soracco, manager of sales, Los Angeles district for **Bethlehem Pacific,** has been appointed assistant to the president of the company. The promotion was announced by **H. H. Fuller,** president.

★ ★ ★

In his new position, Mr. Soracco will be primarily engaged in public and trade relationships as well as matters of general company interest in southern California.

★ ★ ★

S. B. Flora, formerly assistant sales manager, will become the new district sales manager.

Chase Brass Appoints Metallurgical Director

Appointment of **Henry C. Ashley** as metallurgical director at the Chase Metal Works plant of **Chase Brass & Copper Co.,** a subsidiary of **Kennecott Copper Corp.,** was announced by Works Manager **Gilbert R. Boutin.** His appointment is effective Feb. 1, and he succeeds **Benjamin H. McGar,** who retired Jan. 31.

★ ★ ★

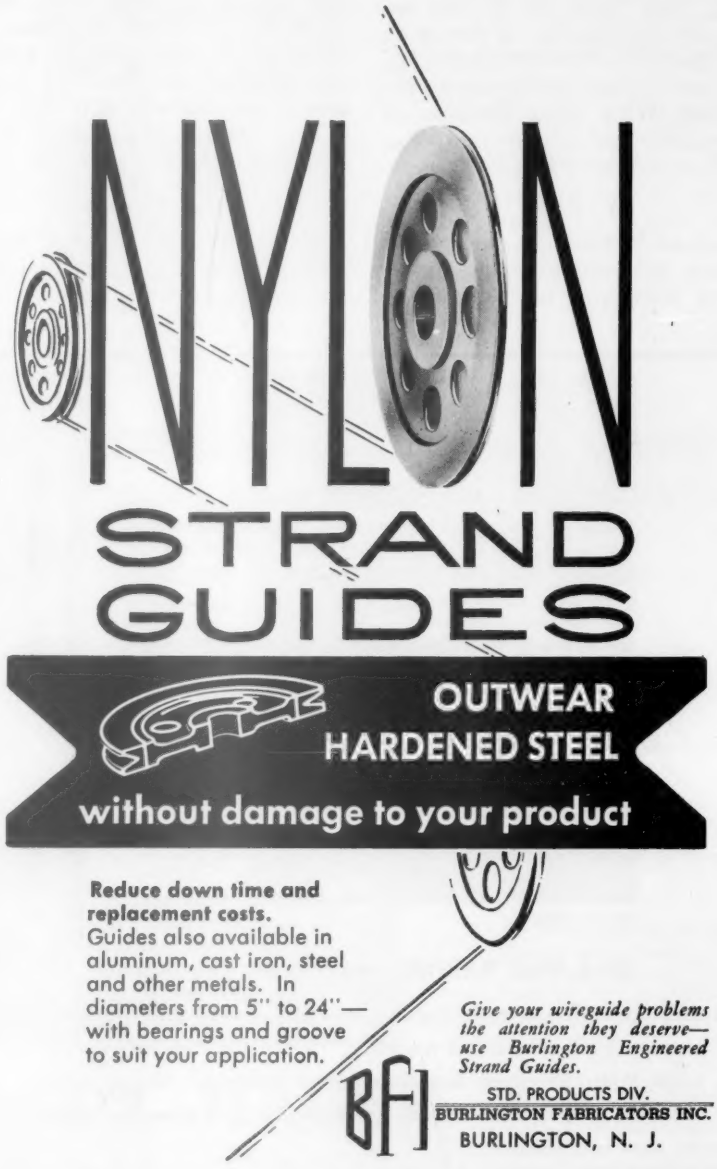
Mr. Ashley was graduated from Worcester Polytechnic Institute with a B.S. degree in Mechanical Engineering. He became associated with Chase in July, 1934, when he accepted a position as research assistant at the Metal Works laboratories. In 1941 he was promoted to metallurgical engineer, holding that position until June 21, 1955, when he was promoted to assistant metallurgical director.

Executive Appointments By Vaughn Machinery

James E. Spearman, formerly assistant to the president, has been appointed sales manager and **Paul J. Kunkler** has been named assistant sales manager of **The Vaughn Machinery Co.,** Cuyahoga Falls, Ohio.

★ ★ ★

Mr. Spearman has been associated with the company since 1940, serving in various capacities in the Purchasing, Sales and Accounting


NYLON
STRAND
GUIDES
OUTWEAR
HARDENED STEEL
without damage to your product
Reduce down time and replacement costs.
Guides also available in aluminum, cast iron, steel and other metals. In diameters from 5" to 24"—with bearings and groove to suit your application.
Give your wireguide problems the attention they deserve—use Burlington Engineered Strand Guides.
BFI
STD. PRODUCTS DIV.
BURLINGTON FABRICATORS INC.
BURLINGTON, N. J.

Departments. Mr. Spearman is a graduate of the University School in Cleveland and attended Yale University.

★ ★ ★

Mr. Kunkler has been a member of Vaughn Machinery's Sales Department since 1950. He attended Western Reserve University and is a graduate of the University of Akron.

Heads Sunbury Wire Rope Operations

The Paulsen-Webber Cordage Corp., New York, N. Y. has announced the election of **Edgar C. Danciger** as a Vice-President. Mr. Danciger is now in charge of the **Sunbury Wire Rope Division** of Paulsen-Webber at Sunbury, Pa., which was acquired in 1957.

★ ★ ★

Paulsen-Webber is one of the leading independent manufacturers of wire rope in the country with executive offices at 170 John Street, New York, and branch offices in Boston, Baltimore, Philadelphia, Norfolk, Houston and New Orleans.

★ ★ ★

The company also has appointed **Henry E. Zopfi** as Regional Manager for Maryland and West Virginia. Mr. Zopfi will be headquartered in the Baltimore office of the company.

Anaconda V.P. to Head AIEE

Nomination of **L. F. Hickernell,** vice president - engineering, **Anaconda Wire & Cable Company,** to be 1958-59 president of the **American Institute of Electrical Engineers,** was announced during the Winter Meeting of the Institute in New York City.

★ ★ ★

Mr. Hickernell, presently treasurer of the Institute, has held numerous important offices in that organization and other engineering societies.

★ ★ ★

He graduated from Grinnell College in 1920 with a bachelor's degree in mathematics-physics and received a bachelor of science degree in electrical engineering from MIT in 1922. He joined the engineering staff of Anaconda in 1931, was named chief engineer in 1933 and in 1957 was appointed to his present post.

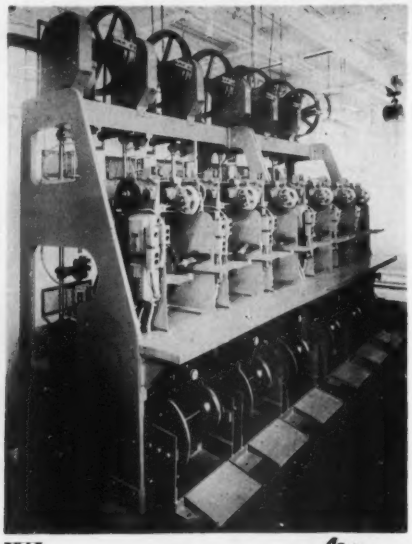
Blane Names Sales Manager

The appointment of **Gerald Kerstein** to the position of Sales Manager of the Compound and Color Concentrate Divisions has been announced by **The Blane Corporation,** Canton, Mass., manufacturers of vinyl compounds and vinyl color concentrates.

★ ★ ★

Mr. Kerstein joined Blane three years ago. He served in the European Theatre of Operations with

FRONT VIEW



REAR

3D-6-MBB TAPING MACHINE #1107

Applies double cover to 6 lines of wire simultaneously. Nominal wire range #6 to #18 B & S gauges (.162" to .040" or 4.116 MM to 1.024 MM). Standard Capstans 24" in diameter. Supply wire let-offs and torque motor driven take-ups for 24" diameter reels are at rear of machine.

EST. 1855 AIMCO INC. 1915

"American"
AIMCO INSULATING MACHINERY COMPANY

REG. U.S. PAT. OFF.

FAIRHILL AND HUNTINGDON STREETS

PHILADELPHIA 33 PENNSYLVANIA U.S.A.

the U. S. Air Force during World War II and is a graduate of the University of Vermont.

Belden Announces Sales Appointments

The appointments of **Les A. Thayer** as General Sales Manager and **E. K. (Gene) Butler** as Manager of Marketing Services for Belden Manufacturing Company were announced by **H. W. Clough,** Vice President of the Chicago electric wire manufacturer. Both men were formerly Division Sales Managers for the company. Appointments of two new District Managers were also announced—**Hoyne Howe** and **E. V. Blake** with headquarters in Chicago and Philadelphia respectively.

★ ★ ★

As General Sales Manager, Les Thayer, who has been with Belden 28 years, will direct all field sales and customer service activities. Gene Butler, a 25-year Belden man, will have charge of product line planning, market research, advertising and sales promotion.

Adds Engineer to Vancouver Staff

The appointment of **N. R. Spencer** as western regional engineer of **Canada Wire and Cable Company, Limited,** is announced by **Frank Ashworth,** Manager, product engineering and product control. Mr. Spencer will be located at the Vancouver sales office, 1494 Powell Street, Vancouver, B. C.

N. R. Spencer

Prior to his present appointment, he was product engineer of the company at the Toronto (Leaside) head office.

Join Firth Sterling

Firth Sterling Inc. announces the appointment of **Charles D. Muir** as a sales representative for its Pittsburgh District Sales Office.

★ ★ ★

Norman E. Donnelly, who has had 17 years of experience in the carbide and steel industries, has been appointed to work out of Pittsburgh, covering Southwest Pennsylvania and West Virginia.

Kaiser Appoints Sales Executives

The appointments of a merchant products sales manager and three regional sales managers for farm, industry and home building materials have been announced by **R. M. Gerber,** manager of merchant products, **Kaiser Aluminum & Chemical Sales, Inc.,** Chicago.

★ ★ ★

Galvanizing in a Ceramic Tank means saving a lot of money!

UNLIMITED LIFE
LESS DROSS
LOW INSTALLATION COSTS

also for galvanizing

WIRE
★ **HEXAGON NETTING**
STRIP

German Patents applied for and Foreign Patents issued.

COVER-HEATED
GALVANIZING FURNACE
FOR PIECE GALVANIZING

OFENBAU FRITZ G.m.b.H. HAGEN i.W., W.-GERMANY

They are **Arnold C. Sanders,** sales manager of merchant products; **Fred B. Scobey,** Western regional sales manager; **S. Chester Harter,** Central region; and **Lynn D. Crowder,** who directs merchant products sales in the Eastern region.

IHE Elects Officers

C. Floyd Olmstead, President of **Lee Wilson Engineering Co.,** Cleveland, Ohio, was elected President of the **Industrial Heating Equipment Association** at its annual winter meeting in Pittsburgh, January 27-28, 1958.

★ ★ ★

R. L. Harper, Executive Vice-President of the **Harper Electric Furnace Corp.,** Buffalo, N. Y., was named Vice-President; **Ralph E. Whittaker,** Secretary and Treasurer of the **Swindell-Dressler Corp.,** Pittsburgh, was re-elected Treasurer; **A. E. Tarr,** Assistant to the President, **Leeds & Northrup Co.,** was elected to the Executive Committee; and **Robert E. Fleming** was re-elected Executive Vice-President.

Rope Company Elects Officer

Russell F. Hendrick has joined **North-West Wire Rope Company,** Oakland, Cal., as Vice President and General Manager according to an announcement made by **Gilbert Weisner,** President. He had been with the **E. H. Edwards Co.** for 27 years.

★ ★ ★

North-West markets handling Bethlehem wire rope as its top line. In addition, it carries "Econo-rope," a foreign rope, and surplus and graded second-hand rope.

★ ★ ★

Specializing in service to wire rope users, North-West recently imported a new, 800-ton press for mechanical splicing. This press, one of the largest of its kind on the west coast, will insure speedy delivery of mechanically safe wire rope fastenings for all industrial uses.

Henry Davis

Henry Davis, assistant to the vice president in charge of sales, Eastern division, and manager of the market research department for the Eastern division of **The Colorado Fuel and Iron Corporation** died Saturday, February 1 at Mount Sinai Hospital in New York City. He was forty-seven years old.

★ ★ ★

In the course of his 22-year association with CF&I in both sales and administrative capacities, Mr. Davis worked with almost all of the company's major product groups.

Retired Copperweld Official Dies

William J. McIlvane, former Executive Vice President, Wire and Cable Div., Copperweld Steel Co., died suddenly of a heart attack on January 26th at his home at Annandale, Virginia. He was 62 years of age and had retired in 1953 because of ill health.

Far greater production in less space with lower cost equipment . . . for all steel and non-ferrous wire.
The fastest, most uniform way to heat treat wire* is often far lowest in cost!
AJAX
HULTGREN
electric SALT BATH furnaces
* Write for case history bulletins on Ajax Electric Salt Baths for
Annealing
Patenting
Cleaning, Preheating
Descaling
Fluxing for Aluminizing
AJAX ELECTRIC COMPANY
928 Frankford Avenue • Philadelphia 23, Pa.
ASSOCIATED COMPANIES:
AJAX ELECTRIC FURNACE CORP. • AJAX ELECTROTHERMIC CORP. • AJAX ENGINEERING CORP.

R B & W Elects Vice President

Election of **Charles S. Hamilton, Jr.**, as vice president and treasurer of **Russell, Burdsall & Ward Bolt and Nut Company** was announced at Port Chester, N. Y., by **William E. Ward**, president.

★ ★ ★

Prior to joining R B & W, Mr. Hamilton was a partner in the New York law firm of Sullivan & Cromwell. He has been a director of R B & W since 1954. Mr. Hamilton replaces **John B. Gates**, who has joined Pan American World Airways as vice president-finance.

Auto-Lite Creates New Posts

Two new posts have been established by **The Electric Auto-Lite Co.**, Toledo, Ohio, to which **S. T. Rose** has been appointed as Group Sales Manager and H. L. Hollingsworth has been appointed Staff Engineer, according to Vice President **R. E. Valk**, who has charge of the Plastics, Wire and Cable, Instruments and Foundry Groups.

★ ★ ★

Mr. Rose will coordinate sales activities in these several groups and assist in the expansion of present and new products. He is a graduate of Ohio State University and attended the Wharton School of Finance.

★ ★ ★

Mr. Hollingsworth, a mechanical engineering graduate of the University of Delaware, will serve as scientific and technical assistant on the Group Staff in the development of new or improved manufacturing processes.

To Handle Sales for Apex Alkali in Northeast

Apex Alkali Products Company of Philadelphia announces the recent promotion of **Robert F. Morton** to Sales Manager for the Northeastern Region.

★ ★ ★

Mr. Morton is a graduate of Amherst College in 1943 and has been associated with Apex Alkali since 1951. He has been acting as territorial representative in New York State and the Provinces of Ontario and Quebec in Canada.

Robert F. Morton

Porter Elects Vice President

Fred W. Elliott has been elected a Vice President of **H. K. Porter Company, Inc.** Mr. Elliott previously had been Assistant to the President, **C. L. Holbert.**

★ ★ ★

He joined Porter in 1956, coming from the Pennsylvania Industrial Corp. Mr. Elliott is a graduate engineer from the University of Pittsburgh; he received his M.S. from Ohio State.

Use HEANIUM®

PULLEYS ARE AVAILABLE IN VARIOUS SIZES AND WITH BEARINGS OR BUSHINGS AS SPECIFIED

WITHSTANDS HI-SPEED PRESSURE OF SYNTHETIC YARNS AND WIRE BY THE TONS

If guide wear is a problem in your mill . . . try Heanium® IS THE BEST GUIDE TO LOW COSTS.

OTHER STANDARD SIZES AVAILABLE

Test samples of HEANIUM stock guides will be furnished without charge.

Address sample requests to Dept. 9.
HEANY INDUSTRIAL CERAMIC CORP.
New Haven 3, Conn.

HEANY INDUSTRIAL CERAMIC CORP.
NEW HAVEN 3, CONNECTICUT

A Review of Recent Wire Patents

The data listed below is only a brief review of recent patents pertinent to the readers and subscribers of this publication.

Complete copies of these patents may be obtained by writing to the publisher of this magazine and remitting 50c for each copy desired. For orders received from outside the United States the cost will be $1.00 per copy.

No. 2,818,763, NAIL FOR PLASTERBOARD, patented January 7, 1958 by Arthur H. Dunlap, Seattle, Wash.

The head is provided with a number of openings into which the plasterboard beneath the head can protrude for relief and for contact by cement.

★ ★ ★

No. 2,818,912, AUXILIARY CUSHION FOR AUTOMOBILE SEATS AND METHOD OF PRODUCING THE SAME, patented January 7, 1958 by Ralph K. Odor, Jr., Edmond, Okla.

This device comprises an elongated, continuous coil spring having a series of spiral rings, the coil spring being wound into a number of convolutions with the rings of each convolution interleaved with the rings of next-adjacent convolutions. A continuous locking element is provided, threaded through the rings for maintaining the same in interleaved relationship. There is also a take-up for drawing the innermost of the convolutions inwardly to hold all of the convolutions in a taut condition.

★ ★ ★

No. 2,818,980, WIRE TRAY FOR DRAINING PARTS OF MILKING MACHINES, patented January 7, 1958 by Bernard H. Losching, Janesville, Wis., assignor to The Schlueter Co., Janesville, Wis.

Constructed wholly of wire, there are a bottom tray, provided with cells, and an elevated rack which also provides a handle for the tray and has cells which vertically align with the cells of the tray for receiving teat cups.

★ ★ ★

No. 2,819,207, PROCESS FOR ENAMELING STEEL, patented January 7, 1958 by George A. Shepard, Parma, Ohio, assignor to Republic Steel Corporation, Cleveland, Ohio, a corporation of New Jersey.

Electrolytically deposited on the steel surface is a coating of finely-divided spongy burned nickel or cobalt, which is produced by immersing a clean ferrous metal body as a cathode approximately one inch from a lead anode in an aqueous solution containing about 100 grams per liter of ammonium sulfate and about 10 grams per liter of nickel sulfate or cobalt sulfate at about 200°F. for between about 5 and 15 second while imposing upon the electrodes a ten-volt current. The enamel coating is applied to the spongy coating.

★ ★ ★

No. 2,819,641, WIRE NAIL WITH INDENTED SHANK SIDES TO INCREASE HOLDING POWER, patented January 14, 1958 by John C. Corckran, Baltimore, Md.

The wire shank has a generally rectangular cross section indented by a series of parallel blunt-bottom grooves with outwardly diverging walls.

★ ★ ★

No. 2,819,850, COIL WINDING MACHINES, patented January 14, 1958 by Julian D. Mathis, Bristol, Pa.

This toroidal coil winding machine includes a tubular wire-carrying bobbin adapted to shuttle between a pair of supported guide pins, with the bobbin passing through a core ring when thrown in one direction and pass outside the core ring when thrown in the opposite direction.

★ ★ ★

No. 2,820,270, METAL FASTENER ASSEMBLIES, patented January 21, 1958 by Robert E. Scott, Detroit, Mich., assignor to Gagnier Fibre Products Company, Detroit, Michigan, a corporation of Michigan.

A fastener of metal strip or wire is provided for mouldings and the like. There are eight claims.

★ ★ ★

No. 2,820,487, GRID FABRICATION METHOD, patented January 21, 1958 by Edward L. Bahm, Ballston Lake, New York, assignor to General Electric Company, a corporation of New York.

The method includes employing re-

PLYMKRAFT CABLE FILLER

TREATED TO MEET YOUR MOISTURE, STRENGTH AND FUNGI REQUIREMENTS

Just name the type treatment—such as wax, jute saturant, anthracene—to meet your moisture and fungi control requirements, and see the difference Plymkraft can make. Plymkraft is made to fit your particular standard of manufacturing. Its greater fill capacity, greater uniformity, save you time and money in a better looking cable. Smooth running Plymkraft is also ideal for high-speed cablers where extra strength is a must. Use Plymkraft Cable Filler for cleaner, more efficient cabling.

To keep up to date with the latest cable filler developments, it takes only an inquiry for samples of Plymkraft. To find the quality cable filler best suited for your wire needs, write today to:

PLYMKRAFT DIVISION
PLYMOUTH CORDAGE COMPANY
Plymouth, Massachusetts

fractory metal wire considerably less than 0.001 inch in diameter.

★ ★ ★

No. 2,820,488, SPRING FORMING APPARATUS, patented January 21, 1958 by Max J. Keltz, Springfield, Mass. assignor to Perkins Machine and Gear Company, West Springfield, Mass., a corporation of Massachusetts.

An adjustable apparatus is disclosed for coiling wire in various selected pitches and employing wire of various diameters, and then cutting off coil sections.

★ ★ ★

No. 2,820,505, SPRING COILING MECHANISM HAVING A COILING ABUTMENT HOLDER OPERATED BY A CAM OPERATED YOKE, patented January 21, 1958 by Edward E. Franks, Jr., Litchfield, and Gustave H. Froelich, Torrington, Conn., assignors to The Torrington Mfg. Co., Torrington, Conn., a corporation of Connecticut.

This machine is a cyclically operable one and adapted to form a first straight spring end, then the coil and next to form a second straight spring end, whereupon the wire is cut off the second end.

★ ★ ★

No. 2,820,598, MAGNETIC TOROIDAL CORE WINDING MACHINE, patented January 21, 1958 by Anthony Aveni, Los Angeles, Calif., assignor to Hughes Aircraft Company, Culver City, Calif., a corporation of Delaware.

A wire carrying bobbin of permeable material is provided with dual electromagnetic means positioned in spaced relationship with each other and on a common axis. There is also electromagnetic means connected with a core support means for laterally displacing the support means and the core relative to the axis of the dual electromagnetic means. There is provided a sequential control means for controlling operation of the electromagnetic means whereby to move the bobbin alternately through a central aperture of the core and past an outer periphery thereof to wind the wire about the core.

★ ★ ★

No. 2,821,020, ORTHODONTIC SECTIONAL ARCH WIRE, patented January 28, 1958 by Archie B. Brusse, Denver, Colo., assignor to Rocky Mountain Metal Products Co., Inc., Denver, Colo., a corporation of Colorado.

Wire of a length equivalent to a substantial portion of a human dental arch is provided with a section consisting of a T-shaped portion.

★ ★ ★

No. 2,821,379, TORQUE SPRING, patented January 28, 1958 by Wilfred T. Donkin, Coldwater, Mich., and Frank G. Sabik, Berwin, Ill., assignors to Mechanical Spring Fabricators, Inc., Chicago, Ill., a corporation of Delaware.

Resilient wire is shaped into a coil form with adjacent convolutions normally being in abutting engagement at one side of the spring and spaced a substantial distance apart at the other side thereof to define therebetween a series of crescent-shaped openings to prevent frictional binding engagement of adjacent convolutions during application of normal torque loads on the spring, these convolutions being substantially equally closely spaced when the spring is torque-loaded to capacity.

New Folder Describes Prentiss Wire Products

A new folder, briefly describing many Prentiss specialty wire products, has just been released. The folder, designed for a rapid reference guide, also includes a handy wire gauge table.

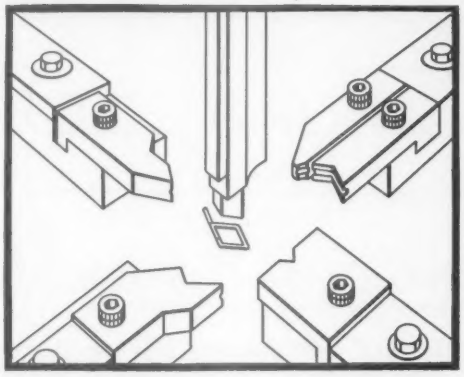
★ ★ ★

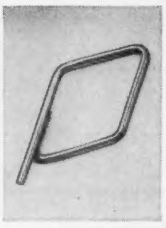
Prentiss Wire Mills, located in Holyoke, Mass., is one of the three plants making up **Riverside-Alloy Metal Div., H. K. Porter Co., Inc.** The plant, which is currently celebrating its 100th year, specializes in both ferrous and non-ferrous wire for the bookbinding, packaging, textile, wire weaving and other industries.

★ ★ ★

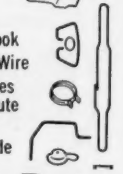
The folder, entitled "Prentiss Wire Products", covers the Prentiss line briefly, but completely. It also describes the various ways Prentiss products can be packed and shipped. Copies of the new folder may be obtained by writing to H. K. Porter Company, Inc., Riverside-Alloy Metal Div., Riverside, N. J.

NILSON 4-SLIDES FORMING PRODUCTION PROFITS... *Automatically*





PRODUCT: Deadlock Hook
MATERIAL: Soft Basic Wire
PRODUCTION: 280 Pieces Per Minute
MACHINE: No. S-0 Nilson 4-Slide



16,000 PARTS PER HOUR on a NILSON *Automatic* 4-SLIDE

Whether your product is formed simply . . . or requires complex bending in several planes . . . a Nilson 4-Slide may be the solution to your production problems.

The sketch above shows the tooling used by a leading manufacturer to mass-produce metal hooks—at the rate of 280 pieces per minute! A Nilson 4-Slide has proved to be the most efficient, economical way to manufacture this product . . . and many other kinds of wire forms and small metal stampings.

Manufacturing costs must be kept down to meet today's competition. The combination of high speed and product uniformity—basic advantages of Nilson 4-Slides—means maximum production, minimum operating costs.

Before you design, tool, or specify manufacturing methods for your product, get in touch with Nilson. Over 60 years of experience with wire and metal forming applications can help you form better products . . . more profitably.

NILSON
THE A. H. NILSON MACHINE CO.
1506 Bridgeport Avenue • Shelton, Conn.
AUTOMATIC WIRE & RIBBON METAL FORMING 4-SLIDE MACHINES • WIRE & STOCK REELS • WIRE STRAIGHTENING EQUIPMENT • AUTOMATIC STAPLE FORMING MACHINES • SPECIAL WIRE FORMING EQUIPMENT

AMERICAN IRON AND STEEL INSTITUTE
150 EAST FORTY-SECOND STREET, NEW YORK 17, N. Y.

AIS 10

Total Number of Companies Included 126

DECEMBER - 1957
Month

SHIPMENTS OF STEEL PRODUCTS
ALL GRADES INCLUDING CARBON, ALLOY AND STAINLESS
(Net Tons)

Covering Net Shipments (Excluding Shipments to Members of the Industry for Conversion into Further Finished Products or for Resale)

Steel Products	Items	CURRENT MONTH 1957 Carbon	Alloy	Stainless	Total	Percent of Total Shipments	Prior Year (1956) Percent of Total Shipments	YEAR TO DATE 1957 Carbon	Alloy	Stainless	Total	Percent of Total Shipments	Prior Year (1956) Percent of Total Shipments
Ingots and Steel Castings	1A	14,397	14,277	636	29,310	0.6	0.8	254,834	188,612	24,010	467,456	0.6	0.9
Blooms, slabs, billets, sheet bars	1B	84,631	25,483	694	110,808	2.2	2.9	1,861,000	426,830	* 20,071	* 2,307,901	2.9	2.7
Tube rounds	1C	2,544	340	-	2,884	-	-	* 51,115	4,035	-	55,150	0.1	-
Skelp	2	5,358	-	-	5,358	0.1	0.4	152,949	-	-	152,949	0.2	0.2
Wire rods	3	63,137	1,314	281	64,732	1.3	1.5	* 938,441	* 18,416	5,056	* 961,913	1.2	1.4
TOTAL SEMI-FINISHED		170,067	41,414	1,611	213,092	4.2	5.6	* 3,258,339	* 637,893	* 49,137	* 3,945,369	5.0	5.2
Structural shapes (heavy)	4	505,027	4,873	7	509,907	10.0	7.3	6,751,905	65,796	95	6,817,796	8.5	6.4
Steel piling	5	38,036	-	-	38,036	0.8	0.7	569,673	-	-	569,673	0.7	0.5
Plates	6	594,904	39,670	1,633	636,207	12.5	8.6	* 8,640,637	569,292	38,696	* 9,248,625	11.6	9.3
Bars—Hot rolled (incl. light shapes)	14	350,045	102,147	2,355	454,547	8.9	11.2	6,038,068	1,475,968	53,364	7,567,400	9.5	10.6
Bars—Reinforcing	15	99,878	-	-	99,878	2.0	3.4	* 2,299,791	336	-	* 2,300,127	2.9	3.0
Bars—Cold finished	16	66,850	13,908	2,813	83,571	1.7	1.8	1,048,964	214,722	55,602	1,319,288	1.6	2.1
Tool steel	17	693	6,017	-	6,710	0.1	0.1	12,318	86,394	-	98,712	0.1	0.2
TOTAL BARS AND TOOL STEEL		517,466	122,072	5,168	644,706	12.7	16.5	* 9,399,141	1,777,420	108,966	* 11,285,527	14.1	15.9
Wire—Drawn	23	159,610	3,112	1,510	164,232	3.2	3.1	* 2,529,374	41,787	27,229	* 2,598,390	3.2	3.5
Wire—Nails & staples	24	19,091	-	1	19,092	0.4	0.4	447,296	-	5	447,301	0.6	0.7
Wire—Barbed & twisted	25	2,111	-	-	2,111	-	-	59,124	-	1	59,125	0.1	0.1
Wire—Woven wire fence	26	9,096	-	-	9,096	0.2	0.2	202,652	-	-	202,652	0.2	0.3
Wire—Bale ties & baling wire	27	950	-	-	950	-	-	* 48,132	-	-	* 48,132	0.1	0.1
TOTAL WIRE & WIRE PRODUCTS		190,858	3,112	1,511	195,481	3.8	3.7	* 3,286,578	41,787	27,235	* 3,355,600	4.2	4.7
Sheets—Hot rolled	31	493,154	25,291	2,080	520,525	10.2	11.7	7,492,072	311,823	26,097	7,829,992	9.8	10.6
Sheets—Cold rolled	32	900,841	1,999	7,795	910,635	17.9	16.0	*11,700,582	41,847	* 136,925	* 11,879,354	14.9	16.0
Sheets—Galvanized	33	159,363	-	-	159,363	3.1	3.4	2,392,469	* 168	-	* 2,392,637	3.0	3.5
Sheets—All other coated	34	17,824	-	-	17,824	0.4	0.2	207,853	-	-	207,853	0.2	0.3
Electrical sheets & strip	35	5,561	31,357	-	36,918	0.7	0.9	86,087	532,776	-	618,863	0.8	1.0
Strip—Hot rolled	36	90,324	1,520	666	92,510	1.8	2.2	1,353,568	30,069	8,823	1,392,460	1.7	2.2
Strip—Cold rolled	37	78,565	1,439	13,583	93,587	1.8	1.4	1,057,442	20,944	* 195,876	* 1,274,262	1.6	1.8
TOTAL SHEETS AND STRIP		1,745,632	61,606	24,124	1,831,362	35.9	35.8	*24,290,073	* 937,627	* 367,721	* 25,595,421	32.0	35.4
TOTAL SHIPMENTS (1957)		4,732,208	325,239	35,466	5,092,913	100.0	xxx	*74,531,609	*4,743,213	* 619,755	* 79,894,577	100.0	xxx
TOTAL — PRIOR YEAR (1956)		6,528,170	473,536	62,387	7,064,093	xxx	100.0	77,005,056	5,558,413	687,699	83,251,168	xxx	100.0

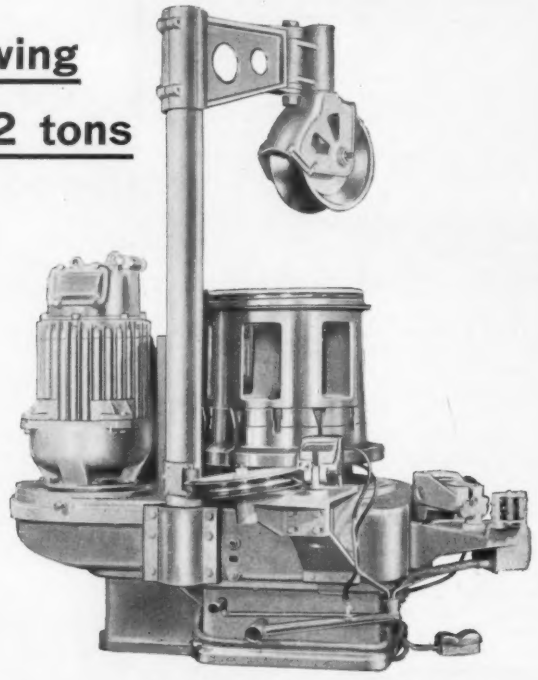
*Revised.

2358

EW

Double Deck Drawing

Pulling power 12 tons



Machines for drawing by single, and multiple draftings both by dry and wet methods at high operating speeds. Automatic electric controls with or without speed regulation.

Emilio Wartenweiler

MILANO (ITALY)
VIA G. B. PERGOLESI N. 18

ALUMINUM INGOT AND MILL PRODUCTS AND MAGNESIUM MILL PRODUCTS: NOVEMBER 1957

(Shipments and receipts are in thousands of pounds)

Item	Number of companies reporting shipments	November 1957			October* 1957 net shipments	November 1956 net shipments
		Gross[1] shipments	Receipts[2]	Net[3] shipments		
ALUMINUM PIG AND INGOT, TOTAL	86	170,874	78,642	92,237	87,696	100,589
ALUMINUM MILL PRODUCTS, TOTAL	160	201,548	14,537	187,011	230,913	218,272
Sheet and plate, non-heat-treatable	28	76,008	10,946	65,062	83,029	72,202
Sheet and plate, heat-treatable	4	13,124	...	13,124	18,527	25,575
Foil, including foil in lamination	15	(D)	(D)	17,144	20,098	16,841
Rolled structural shapes, rod and bar	8	8,190	2,778	5,412	9,090	8,230
Wire, bare	17	3,391	189	3,202	4,206	5,215
ACSR and aluminum cable, bare	11	(D)	(D)	11,790	15,510	12,698
Conductor wire and cable, insulated or covered	15	(D)	(D)	3,720	4,269	5,358
Extruded shapes, soft alloys	99	55,595	534	55,061	60,344	52,038
Extruded shapes, hard alloys	9	2,973	...	2,973	4,271	6,492
Drawn tube, soft alloys	12	3,331	...	3,331	4,194	4,318
Drawn tube, hard alloys						
Welded tube, non-heat-treatable	7	646	...	646	745	1,349
Powder and paste						
Atomized and grained powder	5	372	...	372	583	409
Flaked powder	5	348	...	348	382	370
Paste	5	781	...	781	1,139	937
Forgings	14	3,945	...	3,945	4,526	6,240
MAGNESIUM MILL PRODUCTS, TOTAL	10	(D)	(D)	1,230	1,453	2,141

*Revised.

D Withheld to avoid disclosing figures of individual companies. These figures are included, however, in the appropriate total.

[1]Gross shipments of mill products represent total shipments by producers to customers, including other producers, and shipments by producers to their own fabricating departments which manufacture products beyond the level of mill shapes. Ingot gross shipments include shipments by importers.

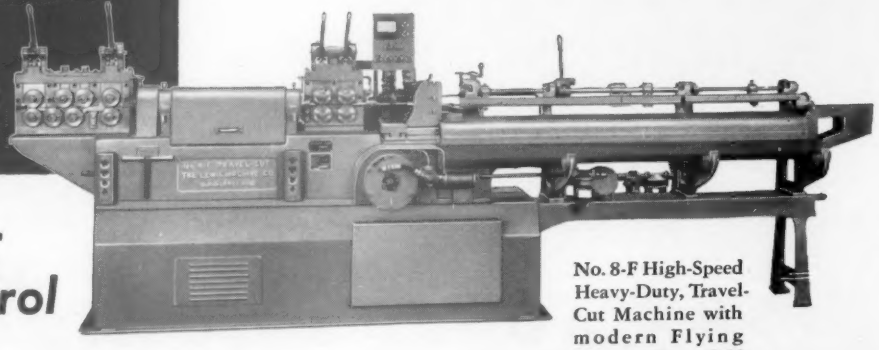
[2]For mill products, represents receipts from domestic producers only. In addition to receipts from domestic producers, 125,000 pounds of mill shapes were received through imports. For ingot, receipts from imports are included.

[3]For mill products, derived by subtracting the sum of producer's domestic receipts of each mill shape from the industry's gross shipments of that shape. Ingot data derived by subtracting all receipts from shipments reported.

WIRE STRAIGHTENING AND CUTTING with Air Clutch and Air Brake

for better quality control

● Greater accuracy with a minimum of spot swell is achieved through three important improvements on the famous Lewis Travel-Cut Wire Straightening and Cutting Machines . . . Wichita Air Clutch and Brake and Reeves Variable Speed Drive. There are 34 models in the Lewis line from .012" to ¾" rounds and shapes at speeds up to 200 FPM. Write for new brochure.



No. 8-F High-Speed Heavy-Duty, Travel-Cut Machine with modern Flying Shear Cut-Off Mechanism. Handles 5/32" to 3/8" dia. wire at speeds up to 200 FPM.

THE LEWIS MACHINE COMPANY

3441 EAST 76TH STREET • CLEVELAND 27, OHIO

SHIPMENTS OF COPPER-BASE MILL AND FOUNDRY PRODUCTS, SECOND AND THIRD QUARTERS 1957 AND THIRD QUARTER 1956

(Millions of pounds - metal weight)

Type of product	1957		1956
	Third quarter	Second quarter	Third quarter
TOTAL SHIPMENTS	1,035	1,164	1,050
Brass mill products, total	450	517	462
Copper-base alloy:			
Sheet and strip[1]	123	136	116
Rod, bar, and wire	125	151	131
Tube and pipe	33	41	36
Unalloyed copper:			
Sheet and strip	46	58	48
Rod, bar, and wire[2]	26	29	36
Tube and pipe	97	102	95
Copper wire mill products[3]	366	409	363
Brass and bronze foundry products[4]	211	229	216
Copper-base powder mill products	8	9	9

[1]Military ammunition cups and discs are included on a net-weight basis, i.e., excluding the weight of the webbing scrap generated in the cupping and discing operation.

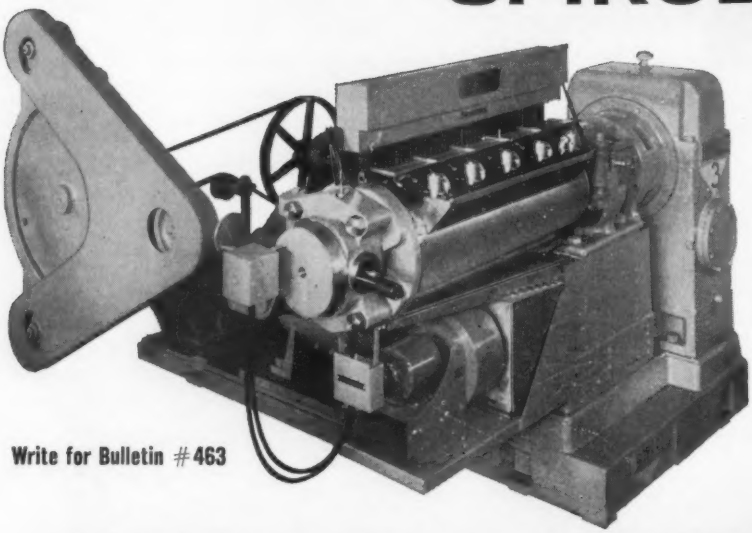
[2]Does not include electrical wire.

[3]Reported in copper content weight rather than metal weight.

[4]Monthly data based on a probability sample are also available in Facts for Industry Series M33E. The differences between M33E and the figures in this table are within one standard error of the M33E data.

ROYLE

SPIROD® for Rubber or Plastic Wire Insulating



Write for Bulletin #463

These all electric extruders with radiant heat and high velocity evaporative cooling are designed to process either plastic or rubber compounds. The result of more than three quarters of a century of experience — Royle pioneered the extrusion process in 1880— in the design and construction of extruding machines time tested features have been built into Spirod to assure dependability.

JOHN ROYLE & SONS

ROYLE PATERSON N. J. 1880

PIONEERED THE CONTINUOUS EXTRUSION PROCESS IN

London, England
James Day (Machinery) Ltd.
Hyde Park 2430 - 0456

Home Office
V. M. Hovey J. W. VanRiper
SHerwood 2-8262

Akron, Ohio
J. C. Clinefelter Co.
BLackstone 3-9222

Downey, Cal.
H. M. Royal, Inc.
TOpax 1-0371

Tokyo, Japan
Okura Trading Co., Ltd.
(56) 2130 - 2149

Transistorized Continuity Test Set

(*Continued from page 296*)

resistance cutoff point determined, as before, by appropriate selection of the bias resistor. For short or cross testing, the test leads were moved so as to be in series with the battery, the cutoff resistance now being determined by the value of the battery series resistance.

★ ★ ★

Because of the many conditions which tended to shorten battery life when operating at higher voltages, it appeared desirable to use different voltages for the two tests rather than a single battery for both. This permitted larger capacity batteries to be used for continuity testing where there is a continuous no load current drain and also allowed this current to be kept to a minimum value consistent with required test voltage. A higher voltage battery, with its inherent lower capacity, when used only while testing for shorts and crosses will have adequate life, since for this circuit arrangement the no load current is zero. The schematic of the modified circuit is shown in Fig. 6, and the asembled unit in Fig. 7.

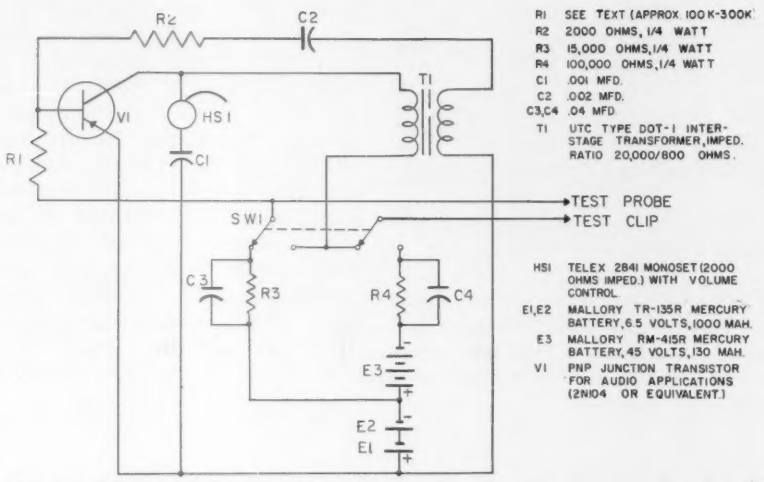


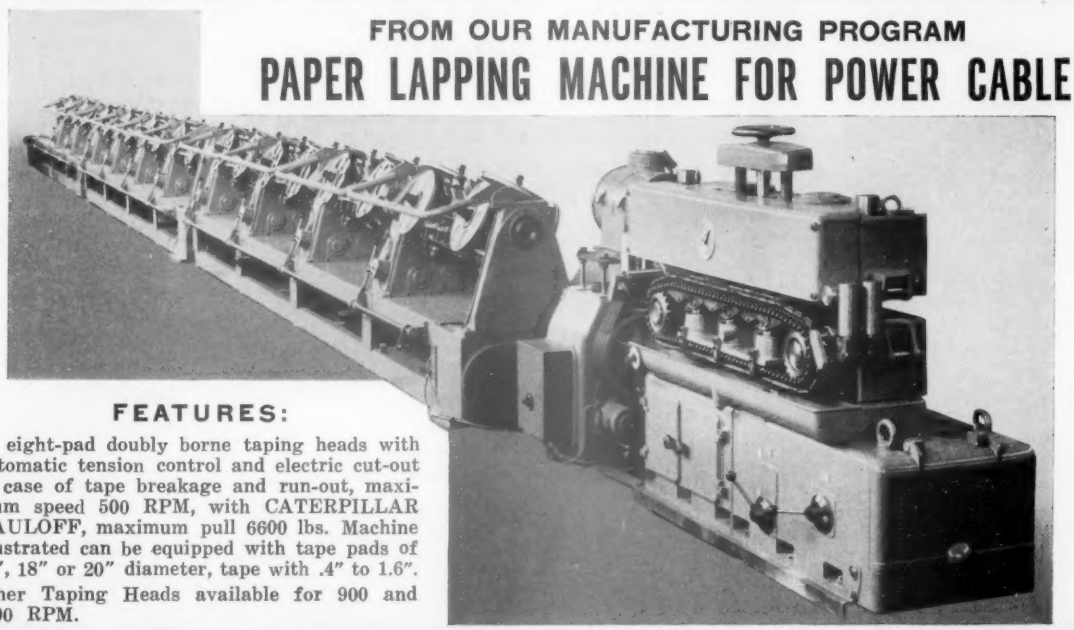
Figure 6. Circuit Diagram—High Voltage Model.

General Assembly

In the final design, continuity power was obtained by using two 6.5 V mercury batteries of 1000 MAH capacity in series to supply approximately 13 volts. For shorts and crosses a 45 V mercury battery of 130 MAH capacity was added in series to increase the supply to approximately 58 V. The relatively uniform output voltage

FROM OUR MANUFACTURING PROGRAM

PAPER LAPPING MACHINE FOR POWER CABLE



FEATURES:

12 eight-pad doubly borne taping heads with automatic tension control and electric cut-out in case of tape breakage and run-out, maximum speed 500 RPM, with CATERPILLAR HAULOFF, maximum pull 6600 lbs. Machine illustrated can be equipped with tape pads of 16", 18" or 20" diameter, tape with .4" to 1.6". Other Taping Heads available for 900 and 1200 RPM.

J. A. KRAFT MASCHINENFABRIK, OLPE/WESTF., GERMANY

HANCOR, INC., 468 Fourth Ave., New York 16, N. Y.

SOLE REPRESENTATIVE IN THE U.S.A. AND CANADA

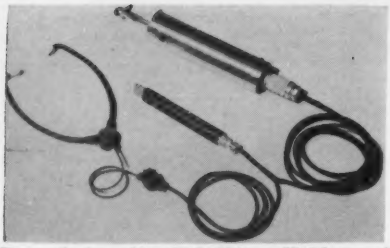


Figure 7. Assembly—High Voltage Model. * *

of the mercury batteries throughout their life is a definite advantage in insuring that the specified voltage is maintained for each test.

★ ★ ★

The higher voltage batteries, being too large to mount in the test probe, were mounted in a separate battery container. To keep this extra component as much out of the way as possible and to eliminate additional connecting leads, it was designed to hang from the test clip used for connection to the stub end of the cable. The lead from this test clip to the probe was increased from one to three conductors to allow connection of the batteries to the oscillator circuit. Removing the batteries from the test probe enabled the probe to be made smaller and its internal construction more compact. All oscillator components are mounted on two bus bars which connect the transistor socket to the probe connector. The complete assembly can be easily slipped out of the probe. A slide type switch is mounted on the battery case which makes the necessary circuit changes for either continuity or short testing.

Characteristics

Operating characteristics represent a compromise between suitable maximum ringout resistance values and reasonable battery drain. The curves of figures 8 and 9 show typical variation with temperature of the maximum resistance through which ringout can occur, for both the continuity and short positions of the selector switch. Current drain on continuity testing is approximately 450 to 550 microamperes over normal ambient temperatures with the test leads shorted. With test leads open, there is a constant current drain of approximately 60 microamperes. For short and cross testing, the current drain is about 500 microamperes with the test

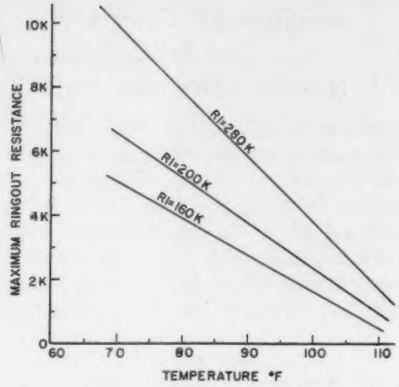


Figure 8. Variation of Cutoff with Temperature—Continuity Test. * * * * * *

Place Your Order **NOW** *for the New*

REVISED 1958 EDITION OF THE

WIRE AND WIRE PRODUCTS BUYERS' GUIDE AND YEAR BOOK OF THE WIRE ASSOCIATION

The many new headings, new products, address changes and other important alterations in the listings of sources of rods, bars, wire, wire products, electric wire and cable, machinery equipment and supplies used in the Wire Industry, make this directory

AN INDISPENSABLE BUYING AID

The Year Book Section is completely new. It will keep you posted on the affairs of THE WIRE ASSOCIATION, providing information, such as:

OFFICERS AND DIRECTORS FOR 1958
LIST OF MEMBERS BY INDIVIDUALS AND COMPANIES
LIST OF MEDAL AWARD AND HONORABLE MENTION WINNERS
CONSTITUTION AND REVISED BY-LAWS
HISTORY OF ASSOCIATION ACTIVITIES IN 1957
INDEX TO ARTICLES IN WIRE AND WIRE PRODUCTS IN 1957
INDEX OF AUTHORS FOR YEAR OF 1957

THE PRICE: $5.00 PER COPY

Keep yourself up-to-date. Order your copy today from

WIRE AND WIRE PRODUCTS

453 MAIN STREET • **STAMFORD, CONNECTICUT**

for extra tonnage
from your bar stock
and wire dies

coat with
BORAX 5 MOL.

Borax and Borax 5 Mol Offer Many Advantages as a Coating Material

Here is dust-free, granular material that is readily soluble in water and dries quickly. The residual film is tight yet pliable... won't flake off! Borax is safe to use, easy to handle, and non-irritating to the skin. You can feed stock faster and you get longer, more accurate performance from your dies.

Check these advantages of borax-coated stock:

- COMPATIBLE WITH DRAWING LUBRICANT
- BETTER WORKING CONDITIONS
- FASTER BUTT WELDING
- LONGER DIE LIFE
- LONGER STORAGE WITH SAFETY
- CLEANER TO HANDLE IN TRANSIT

Write to our Technical Department for further information

United States Borax & Chemical Corporation
PACIFIC COAST BORAX COMPANY DIVISION

50 Rockefeller Plaza, New York 20, N. Y.
630 Shatto Place, Los Angeles 5, Calif.

Los Angeles · Chicago · Philadelphia
New York · Kansas City · Cleveland
Atlanta ®

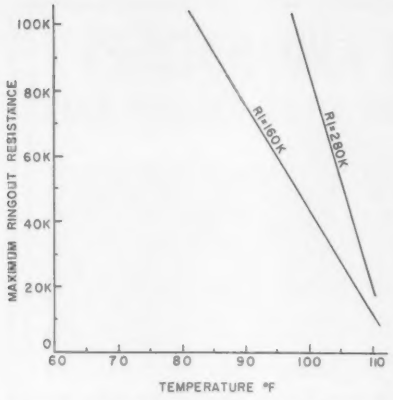


Figure 9. Variation of Cutoff with Temperature—Short and Cross Tests.

leads shorted and zero with the test leads open. Battery life is estimated at about one year.

Cobalt Bibliography on Electroplating

The Cobalt Information Center at Battelle Institute announces a new publication, "Bibliography on Electroplating Cobalt and Cobalt Alloys".

★ ★ ★

This 16-page bibliography encompasses literature on the electroplating of cobalt and its binary and ternary alloys to June, 1957. References to United States and foreign patents are included. Among the alloy systems referenced are: Co-Al, Co-Cr, Co-Cu, Co-Fe, Co-No, Co-Ni, Co-Pd, Co-P, Co-Re, Co-Ag, Co-Sn, Co-Ti, Co-W, Co-Zn, Co-Ge, Co-Hf, Co-Cb, Co-Ta, and Co-Zr.

★ ★ ★

A newly revised edition of "Corrosion Bibliography on Cobalt and Cobalt Alloys" is also offered. This listing contains over 150 references to literature published to mid-1957.

★ ★ ★

These publications will be sent to interested technical personnel who address their request on company letterhead to the Cobalt Information Center, **Battelle Memorial Institute,** 505 King Avenue, Columbus 1, Ohio.

Wire dies have longer life when finished with HYPREZ DIAMOND COMPOUNDS

For every job, Hyprez quality, economy and dependability are recognized as unsurpassed. Your nearby Hyprez distributor will help you solve any difficult lapping or finishing problem that may arise.

Ask for a Free Demonstration or Technical Bulletin

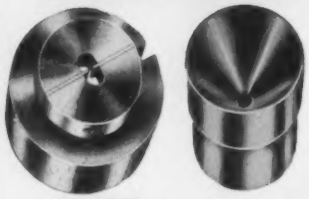
No. HW 38

HYPREZ DIVISION
ENGIS EQUIPMENT CO.
431 S. Dearborn St.
Chicago 5, Ill.

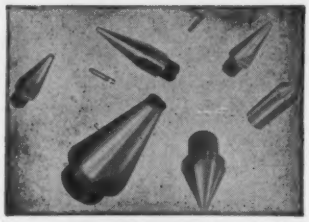
INSULATING DIES AND NOZZLES
for EXTRA-HIGH ELECTRIC WIRE PRODUCTION

CARBIDE AND STEEL

Highest Quality Workmanship and Materials. Standard Types and Special.



STEEL DIES—ALL SHAPES.



CARBIDE EXTRUSION NOZZLES OR TIPS FOR ALL MACHINES.

BRIDGEPORT CARBIDE NOZZLES have phenomenally long life, will lower operating costs and reduce wire breakage.

BRIDGEPORT STEEL DIES are made in Round, Figure 8, Serrated, Tracer and other Special Shapes to your specifications. A newly designed Tru-Rip Die Assembly can be taken apart, cleaned, blades changed and reassembled quickly and easily. Made for 2 and 3 conductor wires to be coated in extrusion machines.

Write for folder or phone for information

WIRE TOOL DIVISION

BRIDGEPORT JIG BORING COMPANY

102 CENTRAL AVENUE, BRIDGEPORT, CONN. TEL.: FOREST 7-8473

Export Dept. ANDOVER INTERNATIONAL INC., P.O. Box 29, Bayside 61, N. Y.

CABLE Address ANDONIK

LEADER IN HIGH PRODUCTION EXTRUSION TOOLS FOR ELECTRIC WIRE

Solves BIG-REEL handling problems

Lifts, tilts, turns loads up to 1500 lbs, easy!

If you shudder each time an employee crashes a big loaded reel on its side, then you should look into this special ACROMETAL handling equipment. It's a pneumatic reel lifter, used with a hoist, and it has a mechanically operated safety lock that holds reel in position if air supply should fail.

Note the trolley on the curved arm. That makes it easy to pick up a reel in any position, turn it to horizontal or vertical, swing it to a pallet. Maneuvering 1500 lb. loads is no job at all—even a girl can do it. Lifter will handle reels with 5" arbors, up to 30" diameter and maximum overall width of 13½".

No more bouncing or crashing on floor to change reel position

ACROMETAL "Reel Grab"

One plant manager said this equipment would save him $10,000 a year on floor repairs alone—to say nothing about the cost of repairing damaged reels. It eliminates a major accident hazard and insures against distorting the lay of the wire. This lifter treats your wire and reels with respect! **Write or call us.**

ACROMETAL PRODUCTS, INC.

616 North 5th Street MINNEAPOLIS 1, MINNESOTA

New "Select-A-Spede" Bulletin

The Louis Allis Company, 427 East Stewart St., Milwaukee 1, Wis., has published a new twelve page bulletin, No. 2000, on the "Select-A-Spede" ajustable speed drive.

★ ★ ★

This unit, available from 5 to 200 HP, is a variable-voltage DC drive that uses AC as its power source. Applications such as machine tools, metal processing, textile, paper making, test stands, conveyors, etc., are discussed and illustrated in the bulletin.

★ ★ ★

Also stressed are ease of installation, optional features for special applications and improvements in savings that can be effected by using this drive.

Wire From Powdered Metal

A German patent has been issued to **Dr.-Ing. Gerhard Naeser** of Duisburg-Huckingen, covering a process for the manufacture of strips, bars, wire or the like from powdered metal. The manufacture results from the heating of the metal powder and hot or cold rolling the cohering material resulting from the heat. The powder, distributed and carried forward on a conveyor belt is heated short of complete sintering. The substance thus resulting is rolled hot.

Larson to Represent Davis-Standard in Canada

Davis-Standard, Division of **Franklin Research Corp.,** Mystic, Conn., has announced the appointment of the **E. V. Larson Co., Ltd.** as Canadian Sales Representative.

★ ★ ★

The E. V. Larson Co., Toronto, will cover all of Canada, handling the entire line of Davis-Standard Thermoplastic and Rubber Extruders and Wire Insulating Machinery. The appointment of this Canadian Sales Representative will provide faster, more efficient servicing of the Canadian market.

★ ★ ★

All inquiries in Canada regarding D-S machinery should be directed to Mr. E. V. Larson, President, E. V. Larson Co., Ltd., 572 Queen Street East, Toronto 2, Ontario, telephone Empire 4-2111.

Offers Extra Bright Galvanized Wire

A new extra bright galvanized wire has just been announced by the **Sambre-Escaut** (Samesco) division of **S. A. Cockerill-Ougree,** Belgium.

★ ★ ★

This wire is desirable for use in manufactured goods requiring a bright, shiny finish—such as baskets, rings, hangers, handles, hooks, ties, etc.

★ ★ ★

This wire is available at no increase in price over ordinary galvanized wire in ASWG sizes from #000 to #20 gauge.

★ ★ ★

Samples of this wire and complete information may be obtained from **M. Paquet & Co.,** 17 Battery Place, New York 4, N. Y.

Salt Bath Furnaces to be Made in Italy Under Ajax License

Appointment of **Italforni** of Milan, Italy, as licensee has been announced by President **Leon B. Rosseau** of the **Ajax Electric Company,** electric salt bath manufacturers, Philadelphia, Pa. Italforni which also makes other furnace types will produce units incorporating Ajax basic designs and principles for sale in Italy.

★ ★ ★

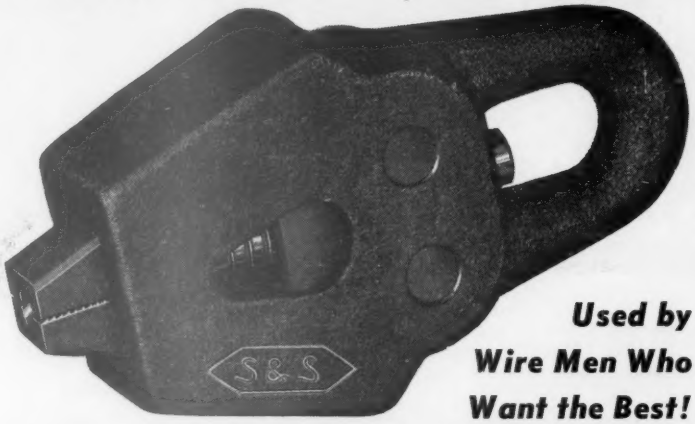
Other Ajax salt bath furnace licensees are located in Canada, France, Sweden, Great Britain, Germany, Belgium and Argentina.

Condensed Catalog on Plastics

Application and physical property data on all plastics produced by the **Naugatuck Chemical Division, United States Rubber Co.,** are condensed in a new eight-page booklet just published by the division.

★ ★ ★

Sjogren WEDGE GRIP



Used by Wire Men Who Want the Best!

Sjogren SINCE S&S 1927
TOOL & MACHINE CO., INC.
WIRE PULLERS • WEDGE GRIPS • JAWS FOR ALL MAKES OF PULLERS AND TESTING MACHINES • CAGE ROLLERS • SWAGING HAMMERS • POINTING DIES • WIRE SPOOLERS

14 Sword St.
AUBURN, MASS.

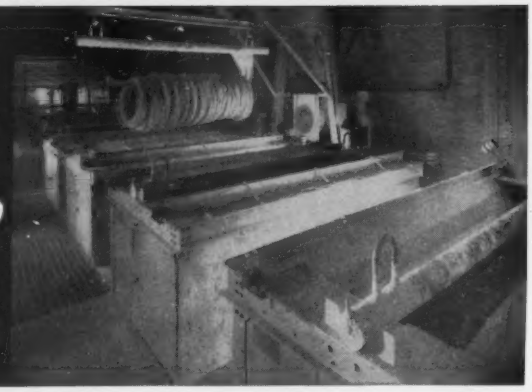
NON-RETURNABLE
REELS FOR MAGNET WIRE PACKAGING
HARDBOARD HEADS — PAPER DRUM
Sizes 12 x 6 x 6 and 12 x 7 x 6½ inches

- Holds up to 100 lbs. of wire.
- Higher impact strength — little breakage.
- Low in cost — no repairs or bookkeeping.
- Waxed for water absorption resistance.
- Every reel brand new — hence accurate and true.
- Produced to customers' specifications.
- Customers' labels can be applied.

ALSO WOOD and PLYWOOD SPOOLS & REELS

DURKEE MFG. CO.
PINE RIVER, MINNESOTA

carl mayer
HI-SPEED REGISTERED
ROD BAKERS



Faster baking, greater fuel economy, maximum production efficiency are just a few of the results of the exclusive heating arrangement of the Carl Mayer Hi-Speed Rod Baker. It also has a patented blow-off feature which removes moisture without damage to coils.

Here are just a few of our many satisfied customers:

American Steel & Wire Co.
Atlas Steel Co.
Colorado Fuel & Iron Corp.
Crucible Steel Co. of America
Driver-Harris Co.
B. Greening Wire Co., Ltd.
Indiana Steel & Wire Co.
Jones & Laughlin Steel Corp.
Republic Steel Corp.
Sheffield Steel Div., Armco Steel Corp.
Steel Company of Canada

Write for Bulletin No. 350

Patent Nos.
U. S. A. 2,296,361
2,323,828
2,235,559
Canada 396,144
401,589

THE carl mayer CORP.
20800 CENTER RIDGE RD., CLEVELAND 16, OHIO
OTHER PRODUCTS: Core Ovens • Mold Ovens • Welding Rod Ovens • Heat Treating Ovens & Furnaces • Special Processing Equipment and Accessories.

The Edmands Company welcomes the Insulated Wire Industry to our new plant in Cranston, R. I.

Come and see our excellent facilities for designing and building wire machinery to our own or customer's design.

The machine tool equipment is modern and has been selected for the efficient machining of wire machinery components.

Our assembly floor is one hundred feet in length, is serviced with a crane over the whole area and is equipped with ample power for test running complete machines.

We would appreciate the opportunity of quoting on your requirements for twisting machines, cabling machines, take-ups or special machines.

THE EDMANDS CO. 860 WELLINGTON AVE. CRANSTON 10, R. I.

Included in the booklet are details on 7 types of Kralastic, a resin-rubber blend that can be extruded, injection molded and calendered; 7 types of Vibrin polyester resin used in reinforced plastic molding, cements, putties and potting, and 12 types of Marvinol vinyl resins used in calendering, extrusion, coating, plastisol compounding and foams. The booklet can be obtained without charge by writing to the Plastics Sales Department, Naugatuck Chemical Div., United States Rubber Co., Naugatuck, Conn.

Guide to Chemical Treatments of Metals

A new 8-page brochure describing various chemical conversion coatings for steel, aluminum, galvanized iron, zinc and cadmium plated surfaces; for corrosion resistance, paint bonding, drawing and forming, and protection for friction surfaces. Also listed are current specification chemicals for the Government and its contractors. Write **American Chemical Paint Company,** Ambler 1, Pa.

Material Handling Show

The 1958 Western Material Handling Show, sponsored by the **American Material Handling Society,** will be presented May 8, 9, 10 in Los Angeles to point out to cost-conscious management the ways and means of eliminating or reducing unnecessary or costly material handling, which represents 87% of all direct labor costs in industry.

★ ★ ★

During the 3 day show, over $5,000,000 worth of equipment gathered from everywhere in the United States will be shown at the Great Western Exhibit Center, Santa Ana Freeway at Atlantic Boulevard. Admission to the show is free by registration to the people of business and industry.

Phifer Adds Pre-Packaged Aluminum Nails

Packed under the trade name, "Temprite," individual packets of

Aluminum Nails made by **Phifer Wire Products,** P. O. Box 9007, Tuscaloosa, Alabama, have been added to the line of products.

★ ★ ★

These nails are the same high quality, electronically tempered nails manufactured by Phifer for the building trade, which heretofore have been offered only in "job-size" boxes and 50 pound cartons. Now making a bid for the buyer who needs a few aluminum nails for an outdoor repair job, Phifer is sealing from 15 to 100 nails (depending on size and type) in a transparent polyethylene bag.

WRI Adds to Membership

The Wire Reinforcement Institute, Washington, D. C., trade association of welded wire fabric manufacturers, has added two new members—**Tennessee Coal & Iron Div.** of United States Steel and **The Steel Company of Canada Ltd.** The addition of TCI, familiar term for the Birmingham, Ala., organization, and Stelco, as the Hamilton, Ontario, company is known, adds 40,000 tons of capacity to the wire fabric industry and raises to over 95% WRI members' share of all wire reinforcement produced in the United States and Canada. The announcement was made by **Frank B. Brown,** Managing Director.

Warren Wire Forms British Company

Warren Wire Co., Pownal, Vt., will form a British-American industrial venture with **Falk Stadelmann & Co. Ltd.** and its subsidiary companies, **Wandleside Cable Works Ltd.** of Wandsworth, **London and Irish Cables, Ltd.,** Newcastle, Northern Ireland.

★ ★ ★

The new company, of which 51% is to be owned by Warren Wire and 49% by Falk Stadelmann, will be called the **Wandleside Warren Wire Ltd.** and will operate in a new factory now being constructed, which will have a production area of 70,000 sq. feet. Operations are scheduled to start in March or April of this year and

"ROME"

WIRE DRAWING COMPOUNDS

Are Engineered by Technical Experts for

SUPERIOR RESULTS

for

STEEL • COPPER • BRASS • ALUMINUM AND OTHER METALS

These compounds, for WET and DRY DRAWING, have demonstrated their superior properties in many leading wire mills. Better wire finishes, longer die life and economy characterize their use.

On *original cost* they also compare favorably.

Write or phone for details.

ROME SOAP MANUFACTURING CO.

SIXTH STREET (Tel.: ROME 139) ROME, N. Y.

— *MANUFACTURERS OF FINE INDUSTRIAL SOAPS SINCE 1896* —

AT YOUR SERVICE

*

SPECIALIZED ENGINEERING
SPECIALIZED EXPERIENCE
SPECIALIZED MACHINERY

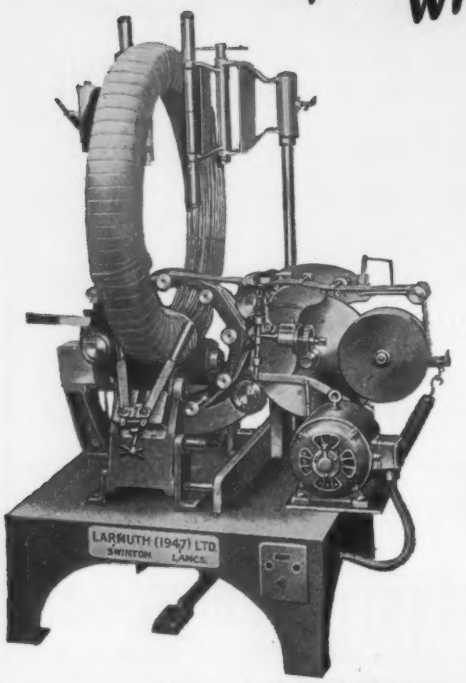
FOR

TWISTING • STRANDING • BUNCHING
Continuous Tension Control
For Precision-Quality

*

HASKELL-DAWES
MACHINE CO., INC.
2231 E. Ontario Street
Philadelphia 34, Pa.

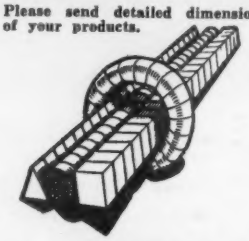
LARMUTH *Spiral Wrapping* MACHINES



are built to finest British engineering standards and are in use throughout the world for spiral wrapping of Motor Tyres, coils of Wire, Strip, etc., from 3" bore upwards. Also straight length Tubes, Bars, Rods, etc.

"BOUND" to get there safely.

Please send detailed dimensions of your products.



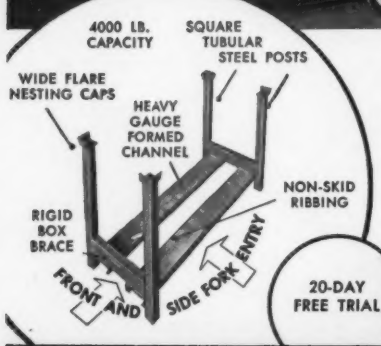
LARMUTH *of England*

U.S.A. Agents: Machinery & Machine Supplies Co., Inc.
305 East 47th St.,
New York 17, N. Y.
Telephone: Plaza 8-0744-5-6-7

LARMUTH (1947) LTD., EAST LANCASHIRE ROAD, SWINTON, MANCHESTER, ENGLAND.
Telephone: Swinton 1015

JARKE
PORTABLE
WIRE COIL RACKS

COURTESY HOLO-KROME SCREW CORP.



Solve Wire Coil Storage Problems

Makes handling and storing of unwieldy wire coils a simple one-man operation. Improves plant housekeeping, saves space, provides positive inventory control. Front and side fork entry permits closer stacking and greater maneuverability in narrow aisles. Saves time, labor, cuts costs. Standard and special sizes.

20-DAY FREE TRIAL

JARKE MANUFACTURING COMPANY

Send for Details
6331 Howard St.
Niles 31, Ill.

MODULAR STORAGE SYSTEMS FOR METAL INDUSTRY • STEELMOBILE

the big cable working machinery will be installed about September of 1958. Initial employment will be approximately 100 and ultimate employment will be over 250.

★ ★ ★

The new factory will be a duplicate of the Warren Wire Company facilities at Pownal and the machinery, valued at about $500,000, will be supplied by the **Cook Manufacturing Co.**, Paterson, N. J.

★ ★ ★

W. L. Wray, Managing Director of Wandleside and Irish Cables is Managing Director of the new company. **John R. Cook** is Chairman of the Board and Hugo Falk, Chairman of Falk Stadelmann, is Vice Chairman. Mr. Cook is President and Treasurer of the Warren Wire and Cook Manufacturing Companies.

New Folder Describes Carbide Facilities

Metal Carbides Corp., Youngstown, Ohio, has recently produced a colorful 24-page folder which presents the facilities and manufacturing processes of the company.

★ ★ ★

Titled "This is Metal Carbides," the folder gives a short introduction by telling the reader that Metal Carbides produces tungsten carbide products by both the hot and cold press method.

★ ★ ★

The "pictorial plant tour" begins with the reduction operation and proceeds through raw material preparation, pressing, storage, product analysis before, during and after production; heating, preforming, weighing and machining. Brazing, grinding and finishing are also presented. The "plant tour in print" ends with the final product inspection and the shipping department operations. Warehouse locations are illustrated on the back page of the informative folder.

★ ★ ★

The new folder will be distributed to customers and prospects personally by sales personnel and via the mails to those who inquire.

Tube Mills Buy Fenn Swagers

The Fenn Manufacturing Co., Newington, Conn., a leading manufacturer of Swaging Machines and other metal forming equipment, has announced that the new **Phelps-Dodge** non-ferrous tube mill in New Jersey, is equipped with Fenn rotary swaging machines. Other new large tube mills equipped with Fenn swagers include: **Scovill Manufacturing Co.**, New Milford, Conn.; **American Brass Tube Mills**, Los Angeles, Calif., and Terre Haute, Ind.; and Anaconda American Brass, New Toronto, Can.

Bulletin on Silicone Rubber

A new four-page bulletin discussing Class 900 silicone rubber for wire and cable insulation is now available from the **Silicone Products Dept., General Electric Company**, Waterford N. Y. The bulletin, designated CDS-104, summarizes the electrical properties of Class 900 rubber compounds, all electrical grade materials, and their physical properties. These include heat resistance superior to any other rubber, low moisture absorption, formation of nonconducting ash when burned and superior thermal conductivity.

★ ★ ★

Applications discussed include industrial power, control, and lighting; aircraft, ignition and appliance wiring; utility installations; heating and defroster wire and cable; Navy cable; and nuclear cable.

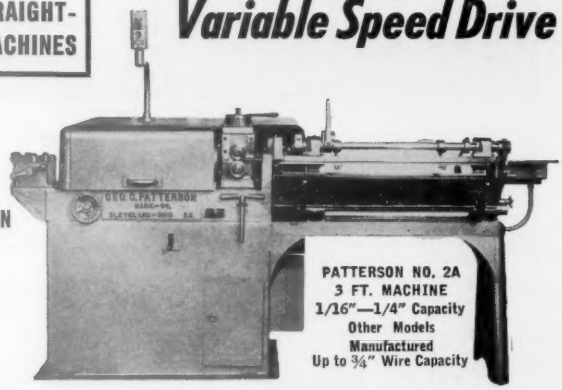
New Catchweight Coil Announced

From four to ten times less down time, scrap ends and wire handling is claimed for Continental's Econo-Coil, a new 2,000 lb. to 3,000 lb. catchweight continuous length wire reel available from **Continental Steel Corp.**, Kokomo, Ind., in practically any temper, analysis and size, from 14 gage through ½" diameter inclusive, produced from low carbon and medium low carbon steels. Volume wire users have found the Econo-Coil makes possible significant savings.

GEO. C. PATTERSON
HI-SPEED
AUTOMATIC WIRE STRAIGHTENING & CUT-OFF MACHINES

Electrically Operated with Variable Speed Drive

- MINIMUM COST
- MAXIMUM PRODUCTION
- ACCURATE LENGTHS
- NEW FEATURES



PATTERSON NO. 2A
3 FT. MACHINE
1/16"—1/4" Capacity
Other Models
Manufactured
Up to ¾" Wire Capacity

Write for free literature on your requirements

THE GEO. C. PATTERSON MACHINE COMPANY
3409 TRUMBULL STREET
CLEVELAND 15, OHIO

PHONE: BROADWAY 1-1808

FAST WIRE SPARKING with PESCHEL DC TESTERS

Electrode of only 1-inch length permits non-destructive fault detection at production rates to 4000 fpm

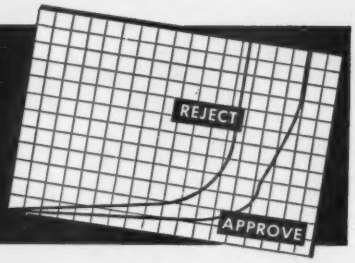
MODEL 10 CVX

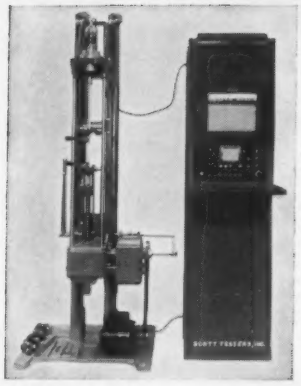
This High Voltage DC Insulation Tester is ideal for use with extruders, vulcanizers or twinners. May be used to replace AC sparkers where 0-10KV DC is ample (20KV models also available).

Accurate, efficient detection, indication and recording of every fault is assured, without burning or marking insulation. Safe and easy operation by unskilled personnel. "Zero-length" electrodes (1" and shorter!) conserve floor space. Supervisory circuits and sectionalized construction facilitate servicing.

For complete technical data, write TODAY to:
PESCHEL ELECTRONICS, INC.
Towners, R.F.D. 1, Patterson, N. Y. • Tel.: TRinity 8-3251

WIRE TENSILE PICTURIZED





Scott Tester* J-5

with "Accr-O-Meter" Constant-Rate-of-Extension Electric Weighing System of Infinite Versatility

CAPACITIES TO 1,000 LBS

The picturized result charts produced for you by Scott Testers are recognized as authoritative the world around as evidence of conformance to ASTM, ISO and Government test methods. These records are invaluable for intelligent and conclusive discussion or correspondence.

ALSO AVAILABLE WITH PENDULUM WEIGHING SYSTEM

* Trademark

SCOTT TESTERS, INC. 55 Blackstone St. Providence, R. I.

Scott Testers — Standard of the World

A special Econo-Coil Carrier that revolves on a heavy base, is supplied on a nominal rental basis by the company. Full reels are easily picked up, two at a time, by a fork truck. The carriers can be stacked for easy warehousing and empties conveniently nested for economical return shipping.

★ ★ ★

An example of the savings possible with the Econo-Coil is shown by the results reported of a comparison made on a straightening and cutting machine with ⅜" wire. For each two machines, efficiency went up 66 2/3 per cent over stranded 220 lb. coils. Using Econo-Coil, scrap loss on this test was 1/6 as great and quality of the cut lengths was improved because the operator was able to spend less time loading the machine and more time watching the operation.

New Type Heat Treat Basket

The first genuinely articulated heat treat basket combines longitudinal strength and lateral support without welding. Because its unique design eliminates the conventional stress points, the New Bixco Basket expands and contracts independently. Increased capacity is obtained because of its outstanding strength to weight ratio while its long life assures greatly reduced maintenance costs. This custom made Bixco basket can be readily adapted to accommodate any special requirements and yet is priced reasonably.

★ ★ ★

For added information, write the **Bix Co.,** Fairgrounds Rd., Wellington, Ohio.

IDA to Have Exhibit at ASTE Show

The Industrial Diamond Association of America plans a comprehensive display at the A.S.T.E. Show, Philadelphia, May, 1958, (Booth 1840), covering all phases of the diamond's uses in industry.

★ ★ ★

With over $1,000,000 worth of diamonds from run-of-mine production, the diamonds will be shown grouped into practical categories of quality and application. This will inform the engineering public about the practical relationship between the diamond and its uses. Diamond tools and products in a large range of types will be displayed, as well as an interesting array of end-products to which the diamond has made an important contribution.

★ ★ ★

There will be an information section with data sheets, an index of technical material that has appeared in the trade press and reprints of many of these articles.

★ ★ ★

The diamond, as the hardest and most effective metal-removing tool, has an ever-increasing importance to existing and new problems in industry and defense.

Crescent Company Reacquired

Milton C. Sapinsley, founder of **The Crescent Company,** manufacturers of Insulated Wire and Cable of Pawtucket, R. I. and his son **John M. Sapinsley,** have contracted to reacquire control of the Company which they sold to Penn-Texas Corporation in 1953.

★ ★ ★

The Company was established in 1920 and expanded from automotive and radio wire and cable into a complete line of electrical, electronic, automotive, welding and mining machine cable and appliance cord sets. It operates the Lowell, Massachusetts Division as well as the Carol Cable Division.

★ ★ ★

Milton C. Sapinsley is Chairman and Treasurer, and **John M. Sapinsley** is President, posts which they held prior to the sale to Penn-Texas and also during the period when the Company stock was owned by Penn-Texas Corporation. There will be no change of personnel.

Fenn Awarded G.E. Contract

The Fenn Manufacturing Co., Newington, Conn., a leading producer of Rolling Mills and other metal forming equipment, has

CUT
Die Room
COSTS
50%
with the New
type "M"

DYKREX
"IT CORRECTS THE DIE"

automatic
Polishing Machine

Double your finished Tungsten Carbide Die production

•

Save ½ labor costs—

•

The new automatic polisher with the Time Switch—

•

It is completely assembled—just plug it in!

ROOS TOOL & MFG. DIVISION
Dykrex Corporation of America
manufacturers of
Wire Die Finishing Machinery
33 Bloomfield Avenue
Newark 4, N. J.
Phone: PIlgrim 4-1500
Western Union
Teletype Service
QAB-WUX—Montclair, N. J.

The Standard of the Wire Industry

been awarded a large rolling mill contract for the General Electric ANP project at Cincinnati, Ohio. The contract includes three tandem rolling mills and special material handling equipment.

Bulletin on UHP Dot Material

Alpha Metals, Inc., 56 Water St., Jersey City, N. J., has issued a bulletin containing helpful facts for ordering and purchasing of Ultra High Purity Dot Material for Semi-Conductors and custom formed High Purity Semi-Conductor soft solder Preforms for automatic soldering.

★ ★ ★

Alpha's high Purity Department metallurgical research staff is available to investigate problems involving the productions of Semi-Conductor Doping Material. The department produces spheres, discs, foil, ring, pellets, wire, cubes, washers, etc. in all sizes, shapes and alloys to exact specifications.

Excerpts from General Electric Review

A new gasoline-resistant appliance wire was developed for The Tokheim Oil Tank & Pump Co., a pump manufacturer. It is suitable for use at 90 C in air, 60 C where exposed to gasoline vapors, and nominal ambient temperatures where exposed to liquid gasoline. To overcome automobile engine-stall that results from vapor lock, the pump manufacturer conceived the idea of locating the fuel pump in the automobile's gasoline tank. And General Electric developed the gasoline-resistant appliance wire, now listed by the Underwriters' Laboratories, Inc. (UL) for this application.

★ ★ ★

For machine tools, a polyvinyl chloride wire has a new improved lubricating surface and a silicone base that won't flake or scrape off or even drip at the wire's highest temperature rating. Actual pull tests in a conduit proved that the new silicone-treated wire pulls up

PLANDEX Hi-Quality
Plastics Reworking Service
Makes Your Scrap More Valuable

STREAMLINED PRODUCTION LINE COMPLETE WITH MODERN
W.E.I. Dual Worm Compounder-Extruders!

Quality and Quantity Control
LABORATORY TESTS EVERY 30 MINUTES ON EVERY JOB

PRECISION REPROCESSING
Plandex "Up-Grades" Your Scrap

SORTING • GRINDING
COMPOUNDING • BLENDING
COLORING • STRAINING
PELLETIZING • MASTER BATCHING

Reworking plastic and rubber scrap is our only product, a service which is built on customized experience and specialized equipment. With Plandex experts working for you, you know that your "waste" will be turned into profitable by-products or reprocessed for reuse in your own plant. Let us prove it to you!

Write for literature or sales engineering appointment.

PLANDEX
COMPANY
DOWNINGTOWN, PA.
PHONE ANDREWS 9-2130

to 3 times easier than the old-style wire with wax surface.

★ ★ ★

In manufacturing, vertical downward extrusion and curing of heavier-wall butyl-base insulation —the type required for high-voltage solid dielectric cables—were put into operation in General Electric's plant at Bridgeport, Conn. The equipment overcomes the danger of insulation eccentricity present in horizontal manufacturing methods.

In 1957, silicone-insulated wire and cable were available for the first time as power cable. They may be installed where the National Electrical Code has jurisdiction. The silicone wire and cable were also listed by UL as type RHH wire for 600-volt, 90 C service in sizes No. 14 Awg to 6 Awg, inclusive.

★ ★ ★

Exploration of aerial cable advanced significantly in 1957 with completion of studies to determine the effect of lightning. These studies, the subject of a symposium at the summer general meeting of the AIEE, indicated possible advantages of continuous metallic sheath. Aluminum was selected because it possesses conductivity, lightweight, and resistance to corrosion. Currently, a 15-kv butyl-insulated cable with aluminum sheath is on trial in service with a leading southern electric utility.

★ ★ ★

An electrical grade silicone-rubber compound was specifically designed and manufactured for wire insulation. Among its applications are aircraft, motor, and apparatus lead wire, defroster and hookup wire, and naval atomic cable.

—The foregoing excerpts are taken from the January, 1958 issue of The Review and are a record of some of the General Electric Company's developments during 1957.

MUSIC WIRE and SPECIAL WIRES

Music Wire for Industrial Purposes
211 sizes Bright Polished, .0015" to .3437"
45 sizes Bright Tinned, .003" to .125"
Aluminum—Annealed—Belt Lacing—Brass, Soft and Spring—Copper, Bare and Tinned
Coppered Steel Spring—Galvanized—Tinned
Monel—Nickel Silver—Pure Soft Nickel—Oil Tempered, Steel Spring, Black Finish
Phosphor Bronze, Spring Temper—Pure Iron Wire—Resistance Wire.
Hoskins Chromel "A"—Stainless, Soft and Spring Temper—Tag Wire, 1000 in an Envelope—Florist Wire—Spooled and Coiled, ¼-½-1-5#
Wires Straightened and Cut to length—Small Gauges—Small orders our specialty
Wires and Strands for the fishermen. Trolling Wires, Copper-Monel-Stainless.
Leader Wires, "Wilstabrite" Stainless and "Silverbrite" Music.

THE MALIN & COMPANY

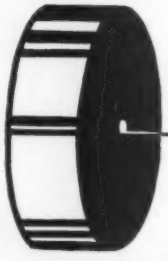
2514 Vestry Ave. Established in 1884 Cleveland 13, Ohio

WIRE DRAWING MACHINERY
AND EQUIPMENT

FINE WIRE MACHINES • SPOOLERS • POINTERS
PATENTING, TEMPERING, GALVANIZING AND TINNING EQUIPMENT FOR WIRE

WRITE FOR PRICES

SUPERIOR TOOL & MANUFACTURING CO.
172 UNION STREET • WORCESTER, MASS.



FOR WET DRAWING AND CLEANING COMPOUNDS
SPECIFY
PERMAG

For more than 33 years, Magnuson Products Corporation has helped solve difficult wire drawing and cleaning problems at considerable savings.

Write, wire or phone today and find out how Magnuson can help you expedite production.

MAGNUSON PRODUCTS CORPORATION
50 COURT ST., BROOKLYN 1, N. Y. In Canada: Canadian PERMAG Products, Ltd., Montreal

Selling British Machinery to the Wire and Cable Industry in Canada

On a business tour to Canada during the months of March, April and May, **Mr. F. M. Larmuth,** Technical Director of **Larmuth & Bulmer Ltd.,** will visit every industrial Province of Canada.

★ ★ ★

One of the purposes of the tour is to implement the recommendation of the recent Canadian Trade Commission by providing information on an improved spares service for users of Larmuth machines for manufacturing wire and fibre ropes and electrical conductors. In addition Mr. Larmuth will take the opportunity of giving full details of a new range of proved machines to both existing users and new business contacts.

★ ★ ★

Arrangements can be made to see Mr. Larmuth through The U. K. Trade Commissioner, Mercantile Bank Bldg., 540 Burrard St., Vancouver, B. C. and The U. K. Trade Commissioner, 1111 Beaver Hall Hill, Montreal, Quebec.

Reliance Pump Motors Bulletin

Reliance Totally Protected Pump Motors, from ⅛ to 1,000 horsepower, are discussed in the new

four-page, two-color Bulletin B-2507. Photos and easy-to-read copy explain the features of the pump motors, which are designed and manufactured for every pump in all types of industries, wherever a prime mover of fluids is required. The bulletin explains the Reliance Partial Motor concept for attaching the machined motor frame directly to a pump frame to form an integrated unit.

★ ★ ★

Copies of Bulletin B-2507 may be had by writing to **Reliance Electric and Engineering Co.,** 24701 Euclid Ave., Cleveland 17, Ohio.

Question and Answer Booklet On X-Rays

A 16-page booklet titled "Questions and Answers on X-ray Diffraction, Diffractometry and Spectrography" is available gratis from the Instruments Division, **Philips Electronics, Inc.,** 750 South Fulton Ave., Mount Vernon, N. Y.

★ ★ ★

Seventy-one questions and answers cover points most frequently raised by people who have attended Norelco X-Ray Diffraction Schools during the past ten years.

★ ★ ★

The booklet explains specimen preparation and describes fields of application for the three basic X-ray analysis methods. It also discusses the selection of analyzing crystals and calibration of the spectrograph for quantitative work on elements.

Building New Annealing and Cleaning House

Techalloy Company, Inc., Rahns, Pa., announces the erection of a new annealing and pickling building. Planned for early 1958 completion, new building will double company's capacity for annealing and pickling Monel, Nickel, Inconel, Inconel "X", Ni-Span-C, stainless and heat-resisting steels together with pure Columbium and other super alloys.

★ ★ ★

In addition to pickling tanks, the building will contain a 35,000 pound gas-fired annealing furnace of both over- and under-fired type to insure uniform temperature throughout metal load and prevent hot and cold spots. Virgo descaling process will be employed to promote smoother, pit-free surfaces.

To Sell Moly Lubes in Canada

Dow Corning Silicones, Ltd., Toronto, has been appointed Canadian distributor for the **Alpha-Molykote Corporation,** Stamford, Conn., it was announced by **David M. Noltie,** Vice President-Sales, who pointed out that Dow Corning's lubrication experience will be of considerable value to Alpha-Molykote customers in Canada. Molykote Lubricants are made of the purest molybdenum disulfide commercially available.

ELECTRIC FLEXIBLE TINSEL CONDUCTORS

Give the longest flex life

In Cord Sets and Loudspeakers,

Electronic, Vibrating and Moving Devices

Tinsel May Solve Your Problem

WRITE — WIRE — PHONE

THE MONTGOMERY COMPANY

25 CANAL STREET — Est. 1871 Tel.: National 3-3336 — WINDSOR LOCKS, CONN.

NIEDERRHEIN WIRE RODS

Open hearth grades from low metalloid through high carbon, Thomas grades, cold heading and special grades for sensitive applications. Heavy coils up to 880 lbs.—I.D. up to 33½". Sizes down to .20".

Reliable delivery schedules at a fair price.

NIEDERRHEINISCHE HUETTE A.G.,

Duisburg, Germany

KURT ORBAN COMPANY, INC.

34A Exchange Place, Jersey City 2, N. J.

In Canada: Kurt Orban Canada, Ltd., Toronto, Montreal, Vancouver

MOLDED WIRE BRAIDER SPOOLS

SMOOTH SPOOL HEADS will not break, warp, knick or rough-up—reducing maintenance costs. The instant locking feature saves time locating "dog-hole". Lighter than metal spools with less wear on Braider and Winder.

Contact us regarding your Spool Problems.

Stocked and sold exclusively by

STANDARD MILL SUPPLY COMPANY

31 ESTEN AVE., PAWTUCKET, R.I.

Telephone, PAwtucket 3-1534

BEHR MANUFACTURES
SINGLE and DOUBLE STROKE
COLD HEADERS
IN ¼" X 2" CAPACITIES
FOR UPSETTING AND FORGING BOLTS, SCREWS, RIVET HEADS, AND OTHER SIMILAR SHAPES

CALL ROCKFORD 2-7721
OR WRITE FOR COMPLETE LITERATURE and PRICES

MANVILLE 250C HEADER PARTS AVAILABLE FROM STOCK

BEHR MACHINERY & EQUIPMENT CORP.
1210 SEMINARY ST.
ROCKFORD, ILLINOIS

Commodity Price Trends—Steel, Copper and Aluminum

(*Continued from page 283*)

sively for many years on the 50,000 volt underground cable network of the Dutch Government in Holland, only small amounts have been used underground in the United States.

★ ★ ★

Con Edison installed its first aluminum cable in 1932, a 795 MCM ACSR 138 KV line from Dunwoodie to Millwood, N. Y. No further aluminum installations were made until 1952. Since then, the usage of aluminum cable, for both overhead and underground service, has been as follows:

Year	Lbs. of Al.
1952	93,000
1953	110,000
1954	181,000
1955	323,000
1956	1,019,000
1957	1,248,000

★ ★ ★

Future use of aluminum conductors will be determined by the economics of the particular application.

Conclusion

Despite all the changes that have taken place in our economy, the Business Cycle has not been eliminated, altho it has been smoothed out somewhat. There are no shortages of any of the metals discussed herein. Prices of basic commodities have dropped to the lowest point in 7½ years. The price of copper has been declining for a year and a half. With steel and aluminum facing over-production, the current post-war high prices will eventually reflect the change from a Sellers market to a Buyers market. Purchasing Agents must nevertheless keep in mind the inflationary effects of the Full Employment Act of 1946, to which both political parties are committed.

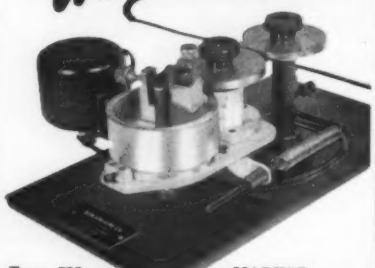
ENGINEERING CAN PLAN
but!
Can Purchasing Procure
ECONOMICALLY?

This is where we fit in. Our TECHNICAL SERVICE is available to help you select the BEST YARN at the BEST PRICES.

WE OFFER
SYNTHETIC YARNS
of
FORTISAN • NYLON • DACRON • ACETATE • ORLON • VISCOSE RAYON and others wound on a variety of packages for Serving, Braiding and Identification Markers.
These Yarns all prepared to meet YOUR and Government specifications.
Write for samples, prices and data.

SYNTHETIC THREAD CORP.
238 West Goepp St., Bethlehem, Penna.
UNiversity 8-8575

Wire Marking



Type SM MARKER

FOR USE ON C.V.'S, PLASTIC EXTRUDERS, REGULAR INSULATORS, COILERS
- For Hot or Cold horizontal marking at the extruders or as a separate operation.
- Does not require cleaning other than for color change.
- Eliminates flat wire and also ink evaporation.
- Flat, concave or special wheels.
- Accommodated diameters of from .010" thru 9.00".

In the marking of extruded material there are BIG advantages in ONE single source of supply.

1. Know-How
2. Inks
3. Wheels
4. Machines

GEM GRAVURE CO.
WEST HANOVER, MASS.
Tel.: Rockland, Mass. - TRiangle 7-0456

Get the habit of reading regularly
WIRE AND WIRE PRODUCTS
The Wire Man's Magazine

You Can Depend on "NATIONAL"
DIAMOND POWDERS
For Consistent High Quality
They Are ALWAYS Clean, Sharp and Accurately Graded for Use.
ONLY TOP QUALITY GRADES!
SPECIAL SERVICE

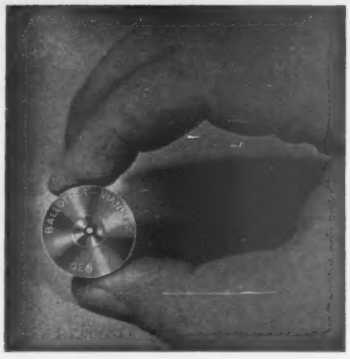
DIAMOND POWDER RECLAIMING
Our exclusive process gives maximum recovery, highest salvage. Send us your old cotton, die washings, sludge and wheels.

DIAMOND GRINDING WHEELS
A complete line of fine quality wheels for industrial production.

Write for information and prices on our several services.

NATIONAL RESEARCH COMPANY
25530 LITTLE MACK AVE.
ST. CLAIR SHORES, MICH.

BALLOFFET VIANNEY WIRE DIE CO., Inc.



All sizes from .114" down to .0003" in stock from New York.

Manufacturers of Quality diamond dies since 1870

BALLOFFET VIANNEY WIRE DIE CO., Inc.
6825 ADAMS ST., GUTTENBERG, N. J.
Tel: Union 3-3393

Techniques for Insulating Wire and Cable with Silicone Rubber

(*Continued from page* 290)

Summary

1. A roller feed, together with a hat, makes an effective mechanical feed for silicone rubber extruders. Such a feed reduces the labor required in the extruding operation.

★ ★ ★

2. A single flight, decreasing pitch screw with a compression ratio of about 3 to 1 seems to give best all-around results when extruding silicone rubbers.

★ ★ ★

3. When insulating wire with silicone rubber and vulcanizing in a hot air vulcanizer, extrusion speeds can be increased greatly by preheating the conductor to 300 to 400 F.

★ ★ ★

4. Semi-vulcanized silicone rubber tape is an excellent material for insulating large size conductors, providing advantages over currently used taped constructions utilizing fully cured tapes.

Mechanical Descaling and Drawing of Mild Steel Rod

(*Continued from page* 302)

Summary

In order to achieve satisfactory results in the drawing of mechanically descaled rods careful attention must be paid to:

a) Length of soap box.

b) Speed of the first hole block.

★ ★ ★

These two factors must be balanced, bearing in mind that the faster the first block, the longer must be the soap box.

Other important points are:

(1) At first block speeds in excess of 200 F.P.M. the descalers under review become less effective.

(2) The rods must be dry.

DIAMOND POWDERS
OF FIRST QUALITY ONLY

For assured quality, accurately graded diamond powders

Specify
"DANFORTH"

They will cost more than "bargain basement" powders, but will finish your dies more economically.

RECLAIMING SERVICE

We will take your waste materials and reclaim the diamond content for you, guaranteeing that it will be 99% or better pure. When returned, it will be properly graded for further use.

Ask for prices and information on our processes.

C. W. DANFORTH CO.
P. O. Box 448, Youngstown, Ohio
Established in 1912

WANT GOOD WIRE? THEN USE "THE BEST" DIES!

Only top-quality DIAMONDS are used by WAYNE. This, plus perfection in workmanship, is responsible for the fine reputation of

WAYNE WIRE DRAWING DIES

Satisfactory DIAMOND DIES can only be made by those who have experience, skill and knowledge. WAYNE has all of these. Users have called WAYNE DIES "the best."

WAYNE WIRE DIE CO., 200 Pennsylvania Ave., Hillside, N. J. Telephone: Elizabeth 2-2456

TUNGSTEN CARBIDE WIRE DRAWING DIES

DESIGNED FOR LONG LIFE AND MAXIMUM WIRE PRODUCTION

Furnished semi-finished to within .001" to .002" of finished size at rough-drilled die prices. Require only light sizing and polishing before using. Our dies embody special design features that make for superior performance.

Also, a full line of carbide tooling for the Cold Heading Industry

EASTERN CARBIDE CORPORATION
NEW ROCHELLE, N. Y.

DIAMOND
and
TUNGSTEN CARBIDE
DIES
for all WIRE DRAWING purposes.
SPECIALISTS IN DIE REPAIR WORK ON ALL TYPES OF DIES.
UNIVERSAL WIRE DIE CO.
202 Pennsylvania Ave., Hillside, N. J.
ELizabeth 2-2456

DIAMOND DIES .0006 - .120 DIAMOND POWDER
INDUSTRIAL
AJAX
SUPPLIES INC.
R.R. 4, P. O. Box 66, Fort Wayne, Ind.

NEW ENGLAND WIRE DIE CO.
7 Forsberg St., Worcester, Mass.
EXPERT RECUTTING
DIAMOND DIES, DIAMOND POWDERS
Eastern Representative of
Ajax Industrial Supplies, Inc.

DIAMOND WIRE DRAWING DIES
DIAMOND POWDER AND COMPOUNDS
DIE RECUTTING SERVICE
CARBIDE DIES • TOOLS • PARTS
RUSCH WIRE DIE CORPORATION
CROTON-ON-HUDSON, N. Y.

DIAMOND CARBIDE
DIES
KELLY
WIRE DIE CORPORATION
19 W. 34th St. New York

"Natdi"
REVERSIBLE DIAMOND DIES
NATIONAL
WIRE DIE CO. INC.
12 WEST 21st St. N.Y. 10, N.Y.

DIAMOND POWDERS
• ALL SIZES •
Diamond Salvage Services Available for "Processing Pounds and Tons."
INDUSTRIAL
DIAMOND POWDERS, INC.
Box 10602
Pittsburgh 35, Pa.

(3) The amount of soap used is no greater than in drawing acid cleaned rods.
(4) The heavier the reduction at the first pass, the better the soap coat obtained.
(5) The same dies may be used for drawing acid cleaned rods and mechanically descaled rods.
(6) Die life is excellent.

Conclusion

In conclusion, I would like to state that in my opinion there is still scope for development and improvement in mechanical descaling; at the time of writing it has achieved much—no doubt in time it will achieve even more. In the meantime I hope that this paper may be of some assistance to those engaged in or contemplating the mechanical descaling and drawing of mild steel rods.

Heat-Resisting Alloy Stock System

A new system of stock shipments for heat-resisting alloys is announced by **Techalloy Company, Inc.**, Rahns, Pa.

★ ★ ★

Now, for the first time in the industry, a manufacturer of heat-resisting alloys offers immediate shipment from stock on a wide range of such alloys in the most common sizes. Included in this complete departure from tradition are Inconel, Monel, Incoloy in sizes of ½" diameter and smaller, and Stainless Steel Types 330, 314, 310, 309 and 304 in sizes of ¼" and smaller.

★ ★ ★

Orders for heat-resisting alloys in these sizes are shipped the same day order is received. Additional information on this new direct-from-stock plan is available from the manufacturer.

Calculator For Wire Cloth

Design and production calculations are simplified for processors of metal wire cloth by a multi-scale slide rule prepared by **Reynolds Wire Division of National-Standard Company.**

★ ★ ★

DIAMOND WIRE DRAWING DIES
and DIAMOND POWDER
INDIANA WIRE DIE COMPANY
314-324 E. Wallace St., Fort Wayne, Indiana
Phone: Harrison 4373

Drawing Angle-Controlled
DIAMOND DIES
HOOSIER WIRE DIE, INC.
1730 Sinclair St., Ft. Wayne, Ind.

DIAMOND DIES
mounted unmounted
For Precision Wire Drawing
BRENON, INC.
Experts In Fine Size Diamond Dies
R.F.D. #2, Box 400, Nixon, N. J.

DIAMOND POWDER
Diamond Reclaiming Services
FORT WAYNE DIAMOND PRODUCTS, Inc.
2623 E. Pontiac Fort Wayne 5, Indiana

FINE WIRE
ENAMELING OVENS
COLBOURNE
Machine Co., 21 Munro St.
Winsted, Conn.

CARBIDE NAIL TOOLING
for
Glader—National-Wikschtrom
Nail Machines
PITTSBURGH CARBIDE DIE CO.
Monongahela, Penna. BLackburn 8-6959

DIAMOND DIES
PROFILED DIES
FINE SIZE DIES
VICTOR J. BOULIN INC.
10 FIRST STREET, PELHAM, N. Y.

DIAMOND DIES
.000's to .102"
For many years . . .
Outstanding in quality,
workmanship and service.
FORT WAYNE WIRE DIE, INC.
2625 E. Pontiac St., Fort Wayne, Ind.

CREPED PAPER
COIL OR BAR WRAPS
NATIONAL WATERPROOF PAPERS, INC.
BEVERLY 1, N. J.

DEPENDABLE WIRE EQUIPMENT
FINE WIRE DRAWING MACHINES
RESPOOLING MACHINES
WIRE PLATING EQUIPMENT
SCREW TYPE TRAVERSES
HODGE BROS. MACHINE SHOP
2 HAVELL ST. • OSSINING, N. Y.

DAVIS ELECTRIC CO.
WALLINGFORD, CONN.
SPARKERS — TAKE-UPS
CAPSTANS — PAY-OFFS
SPOOLERS — TRAVERSES
TEFLON EXTRUDER

Zinc Metallizing Wire
THE PLATT BROS. & CO.
Waterbury 20, CONN.

STRAND-BUFFALO CORP.
No. Tonawanda, N. Y. (near Buffalo)
REELS
WOOD and PLYWOOD
Manufactured to Your Specifications

Wire Measuring...
PRODUCTIMETERS
Send for Catalog No. 40
Precision-built for accuracy and speed. Most complete line offered.
DURANT MANUFACTURING CO.
1918 N. Buffum Street, Milwaukee 1, Wisconsin • 18 Thurbers Ave., Providence 5, R.I.

FINE WIRE RESPOOLING MACHINES
COLBOURNE
Machine Co., 21 Munro St.
Winsted, Conn.

WIRE MACHINERY
PREHEATERS
TESTING EQUIPMENT
Federal Manufacturing Co.
Wallingford, Conn.

EMORY
SPOOLERS AND TRAVERSES
ROBERT J. EMORY CO.
31 E. RUNYON ST., NEWARK 5, N. J.

The calculator gives direct readings of the per cent of open area of any wire cloth with from one to 100 meshes per inch, providing flow rate data required in filtration applications. Other scales facilitate determination of the following information:

Lineal feet per 100 square feet and square feet per 100 lineal feet for any wire cloth between 24″ and 48″ wide.

Weights per 1000 feet of steel, alloy and non-ferrous wire from .003″ to .120″ in diameter.

Weights of wire cloth for various metals, wire diameters and meshes, plus shipping costs per 100 square feet of wire for a wide range of freight rates.

★ ★ ★

Wire cloth fabricators and designers can obtain copies of the calculator by writing Reynolds Wire Division, National-Standard Co., Dixon, Ill.

New Pancake Motor

The Louis Allis Co. recently announced a new Pancake Motor that reduces motor length up to 60% over standard motors of the same rating. It is designed for use on machine tools, roof-ventilating fans and many other space-cramped applications.

★ ★ ★

The Pancake Motor is a flange-type motor of conventional radial air-gap design. It achieves its short length, without reduction in performance, through formed end coils and a one piece housing-bearing bracket.

★ ★ ★

For normal operating conditions it is built in an open drip-proof enclosure. Where dirt, filings, corrosive chemicals, coolants or other contaminants are present, it is furnished in an enclosed construction.

★ ★ ★

It is available in ratings of 1 to 15 HP at 1800, 1200 and 900 RPM. Additional features include: vertical or horizontal mounting, cast iron housing-bearing bracket, modern appearance, factory lubricated bearings and quiet operation.

★ ★ ★

For complete information, request bulletin 2100 covering enclosed motor and/or 2150 covering

NEP · SUMFOAM
ACID INHIBITOR • PICKLING COMPOUND
THE PARKIN CHEMICAL CO.
HIGHLAND BLDG. PITTSBURGH 6, PA.

WOOD REELS and SPOOLS
American Woodworking Company
1″ to 60″ Diameters. Send $1.00 for our catalogue of all wood products made in the U.S.A.
1674 N. Lowell Avenue
Chicago 39, Illinois

CLEVELAND TRAMRAIL
Division of
THE CLEVELAND CRANE & ENGINEERING CO.
WICKLIFFE, OHIO
Leading manufacturers of
OVERHEAD MATERIALS HANDLING EQUIPMENT
for the Wire and Wire Products Industry

WIRE DRAWING MACHINERY AND EQUIPMENT
Rod Frames — 16″ Frames, 8″ Frames — Take-Up Frame, Wire — Pointers — Puller Tongs — General and heat resisting alloy castings for wire mill use.
Circulars on Request
E. J. SCUDDER FOUNDRY & MACHINE CO.
TRENTON, N. J.

for finest quality products
start with
WEBB WIRE
Stainless • Needle • Nickel Alloy
WEBB WIRE
DIVISION OF THE CARPENTER STEEL CO.
NEW BRUNSWICK, N. J.

METALLIZING WIRE
PURE ZINC and CADMIUM
Other Fine Bare Wires
Manufactured to Your Specifications
IMMEDIATE DELIVERY
STAMFORD PROCESSING CO.
10-24 S. Water St., Peekskill, N. Y.

Have You Read
"STEEL WIRE IN AMERICA"?
by Kenneth B. Lewis
The price is $15.00

Immediately Available
WIRE WORKING MACHINERY
FOURSLIDES: Baird, Nilson & Manville, Nos. 0, 1, 2, 3, 4, 5, 3-20, 4-26
U. S. Tool Co. No. 22, 28, & 33 Multislides
Sleeper & Hartley Spring Coilers Nos. 0, 1, 2, 3, 3½, 4, & 5 & Torrington W10 & W12
Vaughn Nos. 8, 10, & 12 Moto-Blocs
Waterbury No. 3 Bull Blocks, Duplex
Morgan 4 stand Wire Drawer with pointer and 100 H.P. motor drive & motor
Waterbury Nos. 1, 2, & 3 Continuous Wire Drawing Machines
PARTIAL STOCK LISTING
"The most diversified stock of machinery in the country. If it's machinery we have it."
National Machinery Exchange
130 Mott St., New York 13, N. Y.
CAnal 6-2470

Engineering and Professional Services

ROMMEL, ALLWINE & ROMMEL
REGISTERED PATENT ATTORNEYS
Suite 438, 815—15th St., N. W.
Washington 5, D. C.

Practice before U. S. Patent Office. Validity and Infringement Investigations and Opinions.
Booklet and form "Evidence of Conception" forwarded upon request.

CONSULTING ENGINEERS
Specializing in Wire Forming Machinery: Preformed Staple Making Machines, Special Stitcher Heads, Modified or New Design.
UNIT-SERVICE ENGINEERS
4049 W. Eastwood
Chicago 30, Illinois

FINE WIRE 8-SPINDLE TAKE-UPS
COLBOURNE
Machine Co., 21 Munro St.
Winsted, Conn.

PLANT MANAGER
Experienced wire and cable manufacturing executive to take complete charge of modern integrated wire plant in the New York metropolitan area. Salary limited only by ability. Please submit resume. All replies held in strict confidence.
Reply to Box 937
WIRE & WIRE PRODUCTS
453 Main Street Stamford, Conn.

ENGINEER - PLASTIC EXTRUSIONS
Opportunity for man experienced in PVC, poly, silicone rubber, nylon, as applied to wire and cable; also plastic coatings as applicable to various military specs. Engineering degree desirable. Metropolitan N.Y. area. Send resume and salary requirements to:
Box 938
WIRE & WIRE PRODUCTS
453 Main Street Stamford, Conn.

PARTNERSHIP
Growing Company representing European manufacturers of machines for North America exclusively seeks a graduate (man) with experience in the wire and cable industry, or technical salesman as associate for mutual advantage.
Send resume of experience and financial background. All replies strictly confidential.
Box 924
WIRE AND WIRE PRODUCTS
453 Main Street Stamford, Conn.

COST ACCOUNTANT
Well-known southern cable manufacturer offers excellent opportunities and working conditions for fully qualified person to take charge of the time standards department. Applicant must be a college graduate with a degree in either business administration or industrial engineering with at least five years in either accounting for cost or time standards. It is also desirable, but not necessary, that the applicant have experience in the wire and cable industry with a knowledge of production techniques. Please send complete resume and salary requirements to:
Box 936
WIRE & WIRE PRODUCTS
453 Main Street Stamford, Conn.

AFTER APRIL FIRST
EXTRA COPIES OF THE
BUYER'S GUIDE
AVAILABLE FOR $5.00 EACH

open drip-proof motor, from the Louis Allis Co., Dept. P, 427 E. Stewart St., Milwaukee 1, Wis.

Multi-Slide Machine Introduced

The Pan American Supply Company, 15 West 44th St., New York, has introduced a new Universal Multi-Slide Bending Machine manufactured by the Bihler Company of Western Germany. The photograph shows Model R M 25 with standard equipment of four slides.

It can combine up to 16 operations, including stamping, sawing, threading and even electric point welding. The range is for wire up to .080" diameter and strip up to 9/16" width. Output up to 350 pieces per minute.

★ ★ ★

Pan American, headed by **Severin R. Rodin,** has been recently established as an exclusive sales office for the United States and Canada for several leading Western Germany manufacturers of wire working machinery.

★ ★ ★

The line features wire straightening and cutting, chain, spring and bending machines.

German Wire Mill Increasing Rod Capacity

Kurt Orban, President of **Kurt Orban Co.,** Jersey City, N. J. has announced that one of their principals, **Niederrheinische Hutte A. G.** of Duisberg, Germany, has shut down its No. 3 rod mill to convert it from two finishing strands to four.

★ ★ ★

When the work is completed, it is said, the new rod mill, besides doubling capacity, will be one of the latest and most modern to be built anywhere. The work is expected to be completed and the mill placed in operation in the latter part of February. In the meantime the No.1 and No. 2 mills continue to operate at the Niederrhein plant.

Bulletin on Interlocked Armored Cable

A new 12-page illustrated bulletin, "Interlocked Armored Cables," is now available from **Rome Cable Corporation,** Rome, N. Y.

★ ★ ★

Four types of interlocked cables, 600-volt, 5,000-volt, 15,000-volt grounded neutral and 15,000-volt ungrounded neutral, are described.

★ ★ ★

General information is given on installation, circuit flexibility, accessibility, moisture resistance, mechanical toughness, ampacity, and space requirements.

★ ★ ★

Please write for Bulletin RCP-730.

Index to Advertisers

A

Acrometal Products, Inc. ..... 318 and 332
Ajax Electric Company 322
Ajax Industrial Supplies, Inc. 344
Allis Company, Louis, The 234
American Chemical Paint Company 264-B
American Insulating Machinery Company 320
American Pulley Co., The, Hubbard Spool Co., Division.. 273 and 274
American Woodworking Company 345
Apco Mossberg Company 309
Armco Steel Corporation, Sheffield Division 266

B

Balloffet-Vianney Wire Die Co., Inc. 343
Behr Machinery & Equipment Corp. 342
Blane Corporation, The 257
Boulin, Victor J., Inc. 344
Brenon, Inc. 344
Bridge Manufacturing Company 235
Burlington Fabricators, Inc. 319

C

Carl Mayer Corp., The 334
Carpenter Steel Co., The, Webb Wire Div. 345
Carris Reels, Inc. 312
Cleveland Tramrail Division of
Cleveland Crane & Engineering Co. 345
Colbourne Machine Co. ..... 344-345 and 346
Colorado Fuel & Iron Corporation, The ..... 240 and 241
Continental Can Company 271
Continental Steel Corporation 310
Cook Manufacturing Co. 262
Coulter & McKenzie Machine Co., Inc., The ..... Inside Front Cover

D

Danforth Company, C. W. 343
Davis Electric Co. 345
Davis-Standard Division of Franklin
Research Corporation 248-B
DuPont de Nemours & Co., (Inc.), E. I.
Polychemical Dept. ..... 296-A, B, C and D
Durant Manufacturing Co. 345
Durkee Mfg. Co. 333
Dykrex Corporation of America 339

E

Eastern Carbide Corporation 343
Edmands Co., The 334
Electric Furnace Co., The ..... Back Cover
Elgin National Watch Company, Abrasives Division 284
Emory Company, Robert J. 345
Engis Equipment Co., Hyprez Division 331
Entwistle Manufacturing Corporation 272

F

Federal Manufacturing Co. 345
Fort Wayne Diamond Products, Inc. 344
Fort Wayne Wire Die, Inc. 344

G

Gem Gravure Co. 342
Gillies Co., Inc., Duncan M. 308
Glader Machine Works, Wm. 316
Godderidge Ste 297

H

Haskell-Dawes Machine Co., Inc. 335
Heany Industrial Ceramic Corp. 323
Herborn, Maschinenfabrik 247
Hodge Bros. Machine Shop 345
Hoosier Wire Die, Inc. 344
Hubbard Spool Company Division,
The American Pulley Co. ..... 273 and 274

I

Indiana Wire Die Company 344
Industrial Diamond Powders, Inc. 344
Industrial Winding Machinery Corporation 268

J

Jarke Manufacturing Company 336

K

Kelly Wire Die Corporation 344
Kennametal, Inc. 260
Keystone Steel & Wire Company 264-A
Kraft Maschinenfabrik, J. A. 329

L

Larmuth (1947) Ltd. 336
Lewis Machine Company, The 327

M

Magnuson Products Corporation 340
Malin & Company, The 340
Metallurgical Products Department of
General Electric Company 258
Michigan Oven Company 270
Micro Products Company 239
Miller Company, Inc., R. H. 276
Monsanto Chemical Co., Plastics Div. 254
Montgomery Company, The 341
Morgan Construction Company 236
Morgardshammars Mek Verkstads A B 253
Mossberg Pressed Steel Corporation Div. of
Wanskuck Co. 317

N

National Electric Welding Machines Co. 252
National Machinery Exchange 345
National Research Company 342
National Standard Company 256
National Vulcanized Fibre Company, Lestershire Spool Division.. 311
National Waterproof Papers, Inc. 345
National Wire Die Co., Inc. 344
Naugatuck Chemical Division
United States Rubber Company—Paracril Division 267
New England Butt Co., Division Wanskuck Company 246
New England Wire Die Co. 344
Nichols Wire & Aluminum Co. 245
Nilson Machine Co., A. H., The 325
Nopco Chemical Company 238
Norton & Co., Ltd., Sir James Farmer 269

O

Ofenbau, Fritz 321
Orban Company, Inc., Kurt 341

P

Pacific Coast Borax Company, Division of
United States Borax & Chemical Corporation 331
Pan-American Supply Co. 248
Parkin Chemical Co., The 345
Patterson Machine Company, Geo. C., The 337
Peschel Electronics, Inc. 337
Pittsburgh Carbide Die Co. 344
Pittsburgh Coke & Chemical Co. 251
Plandex Company 339
Platt Bros. & Co., The 345
Plymouth Cordage Company, Plymkraft Division 324
Porter Company, Inc., H. K., Riverside-Alloy
Metal Division 313

R

Republic Steel Corporation 237
Riverside-Alloy Metal Division, H. K. Porter Company, Inc. 313
Roebling's Sons Corporation, John A. 248-A
Rome Soap Mfg. Co. 335
Rommel, Allwine & Rommel 346
Royle & Sons, John 328
Rusch Wire Die Corporation 344

S

Scott Testers, Inc. 338
Scudder Foundry & Machine Co., E. J. 345
Shawinigan Resins Corporation 263
Sheffield Division, Armco Steel Corporation 266
Sjogren Tool & Machine Co., Inc. 333
Sleeper & Hartley, Inc. 259
Stamford Processing Co. 345
Standard Industrial Compounds Co., Inc. 233
Standard Mill Supply Company 341
Strand-Buffalo Corp. 345
Superior Tool & Manufacturing Co. 340
Swift & Company 249
Sylvania Electric Products Inc., Parts Division 265
Syncro Machine Company 264
Synthetic Thread Corp. 342

T

Twitchell, Inc., E. W. 315

U

Unit Service Engineers 346
United States Borax & Chemical Corporation
Pacific Coast Borax Company Division 331
United States Rubber Company, Naugatuck Chemical Division,
Paracril Div. 267
United Wire & Supply Corporation 261
Universal Wire Die Co. 344
U.S. Industrial Chemicals Co., Division of
National Distillers & Chemical Corp. 242

V

Vaughn Machinery Company, The ..... Front Cover

W

Wardwell Braiding Machine Co. 314
Wartenweiler, Emilio 326
Waterbury-Farrel Foundry & Machine Co., The 255
Watson Machine Company ..... Inside Back Cover
Wayne Wire Die Co. 343
Webb Wire Div., Carpenter Steel Co., The 345
Wilson, Lee, Engineering Company, Inc. 243
Wire & Textile Machinery, Inc. 250
Wire Tool Division, Bridgeport Jig Boring Company 332

Y

Youngstown Sheet & Tube Company, The 244

WHERE TO BUY

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.
Only advertisers who have contracted for six or more insertions are listed in this section.

ABRASIVES—
Amplex Corporation, West Hartford, Conn.
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Hyprez Div., Engis Equipment Co., Chicago, Ill.
Norton Co., Worcester, Mass.

ACID INHIBITORS—
(See Inhibitors, Pickling)

ADJUSTABLE SPEED DRIVES—
The Louis Allis Company, Milwaukee, Wisc.

ANNEALING MACHINES — Electric Resistance
Synero Machine Co., Perth Amboy, N. J.

ANNEALING POTS AND BOXES—
Scudder, E. J. Fdry. & Mach. Co., Trenton, N. J.

BAKERS—
(See OVENS—Rod Bakers)

BOBBINS—Braider & Wire Weaving
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.
National Vulcanized Fibre Co., Lestershire Spool Div., Wilmington, Del.
Standard Mill Supply Co., Pawtucket, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

BORAX—Wire Drawing
United States Borax & Chemical Corp., Pacific Coast Borax Co. Div., New York, N. Y.

BORON CARBIDE—
Norton Co., Worcester, Mass.

CABLE FILLERS—Paper
Plymouth Cordage Company, Plymkraft Division, Plymouth, Mass.
Twitchell, Inc., E. W., Philadelphia, Pa.

CAPSTANS—for Wire (also Caterpillar Types)
Colbourne Machine Company, Winsted, Conn.
Davis Electric Co., Wallingford, Conn.
Entwistle Manufacturing Corporation, Providence, R. I.
Kraft, J. A. Maschinenfabrik, OLPE/Westf., Germany
Litzler, C. A. Co., Inc., Cleveland, Ohio

CARRIERS—Braider, High Speed
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.
New England Butt Co., Providence, R. I., Division of Wanskuck Co.
Wardwell Braiding Machine Co., Central Falls, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

CASTINGS—Wire Mill
Scudder, E. J. Fdry. & Mach. Co., Trenton, N. J.

CEMENTS—Refractory
Norton Co., Worcester, Mass.

CLEANERS—Metal
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Phila., Pa.
Magnuson Products Corporation, Brooklyn, N.Y.
Miller, R. H., Co., Inc., Homer, N. Y.
Parkin Chemical Co., The, Pittsburgh, Pa.
Rome Soap Manufacturing Co., Rome, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.

CLEANING & PICKLING EQUIP.—
Cleveland Tramrail Div., of the Cleveland Crane & Engineering Co., Wickliffe, Ohio
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wilson, Lee, Engr. Co., Cleveland, Ohio

CLOTH—WIRE, All Metals
Wickwire Bros., Cortland, N. Y.

COATING COMPOUNDS—
Apex Alkali Products Co., Philadelphia, Pa.
Magnuson Products Corporation, Brooklyn, N.Y.
Miller, R. H., Co., Homer, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.
United States Borax & Chemical Corp., Div. Pacific Coast Borax Co., New York, N. Y.

COLOR CONCENTRATES— For Wire Coatings
Blane Corporation, The, Canton, Mass.

COMPOUNDS—Coppering
American Chemical Paint Co., Ambler, Pa.
Miller, R. H. Co., Inc., Homer, N. Y.

COMPOUNDS—Diamond (Pre-Mixed)
Amplex Corporation, West Hartford, Conn.
Eastern Carbide Corp., New Rochelle, N. Y.
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Hyprez Div., Engis Equipment Co., Chicago
Rusch Wire Die Corporation, Croton-on-Hudson, N. Y.

COMPOUNDS—Extrusion for Wire
Monsanto Chemical Company, Plastics Division, Springfield, Mass.
U. S. Industrial Chemicals Company, Division of National Distillers & Chemical Corporation, New York, N. Y.

COMPOUNDS—For Improving Drawing & Extrusion
American Chemical Paint Co., Ambler, Pa.

COMPOUNDS—Metal Finishing
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.

COMPOUNDS—Phosphate Coating
American Chemical Paint Co., Ambler, Pa.

COMPOUNDS—Rust Preventing
American Chemical Paint Co., Ambler, Pa.
American Lanolin Corporation, Lawrence, Mass.
Apex Alkali Products Co., Philadelphia, Pa.
Rome Soap Manufacturing Co., Rome, N. Y.

COMPOUNDS—Rust Removing
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Magnuson Products Corporation, Brooklyn, N.Y.
Standard Industrial Compounds Co., Frankfort, Ill.

COMPOUNDS—Vinyl
Blane Corporation, The, Canton, Mass.
Monsanto Chemical Company, Plastics Division, Springfield, Mass.

COMPOUNDS—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Magnuson Products Corporation, Brooklyn, N.Y.
Miller, R. H. Co., Inc., Homer, N. Y.
Nopco Chemical Co., Harrison, N. J.
Rome Soap Manufacturing Co., Rome, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.
Swift & Company, Chicago, Ill.
United States Borax & Chemical Corp., Pacific Coast Borax Co. Div., New York, N. Y.

CONDUCTORS—Flexible, Electrical
Montgomery Co., The, Windsor Locks, Conn.

CONTAINERS—Wire Packaging
(See DRUMS—Wire Packaging)

COPHOLDERS—Steel
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

CORDS—Electrical, Tinsel Conductor
Montgomery Co., The, Windsor Locks, Conn.

COUNTERS—
(See MACHINERY—Measuring Wire and Cable)

CRANES—Wire Mill
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

CUTTING TOOLS—Carbide
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Metal Carbides Corporation, Youngstown, Ohio
Metallurgical Products Dept. of General Electric Co., Detroit

CUTTING TOOLS—Wire
Manco Mfg. Co., Bradley, Illinois
Porter, H. K., Inc., Somerville, Mass.
Robinson, M. W. Co., Rockfall, Conn.

DIAMONDS—Industrial
Amplex Corporation, West Hartford, Conn.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Wayne Wire Die Co., Hillside, N. J.

DIAMOND POWDERS—
Amplex Corporation, West Hartford, Conn.
Danforth, The C. W. Co., Youngstown, Ohio
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Hyprez Div., Engis Equipment Co., Chicago, Ill.
Indiana Wire Die Co., Ft. Wayne, Ind.
Industrial Diamond Powders, Inc., Pittsburgh, Pa.
Kelly Wire Die Corp., New York, N. Y.
National Research Company, St. Clair Shores, Mich.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Universal Wire Die Co., Hillside, N. J.
Wayne Wire Die Co., Hillside, N. J.

DIAMOND POWDER RECLAIMING—
Danforth, The C. W. Co., Youngstown, Ohio
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Industrial Diamond Powders, Inc., Pittsburgh, Pa.
Kelly Wire Die Corp., New York, N. Y.
National Research Co., St. Clair Shores, Mich.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.

DIAMOND TOOLS—
Amplex Corporation, West Hartford, Conn.
Indiana Wire Die Co., Ft. Wayne, Ind.
Metal Carbides Corporation, Youngstown, Ohio
Universal Wire Die Co., Hillside, N. J.
Wayne Wire Die Co., Hillside, N. J.

DIES—Carbide, Tungsten & Tantalum
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc., New York, N. Y.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelloy Corporation, New York, N. Y.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstown, O.
Metallurgical Products Dept. of General Electric Co., Detroit
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Universal Wire Die Co., Hillside, N. J.
Wayne Wire Die Co., Hillside, N. J.

DIES—Cold Heading
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelloy Corporation, New York, N. Y.
Metal Carbides Corporation, Youngstown, Ohio
Metallurgical Products Dept. of General Electric Co., Detroit

DIES—Diamond
Ajax Industrial Supplies, Inc., Ft. Wayne, Ind.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc., New York, N. Y.
Brenon, Inc., Nixon, N. J.
Ft. Wayne Wire Die Inc., Fort Wayne, Ind.
Hoosier Wire Die, Inc., Fort Wayne, Ind.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
National Wire Die Co., Inc., New York, N. Y.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Universal Wire Die Co., Hillside, N. J.
Wayne Wire Die Co., Hillside, N. J.

DIES DIAMOND—Drawing Angle Controlled
Hoosier Wire Die, Inc., Ft. Wayne, Ind.

DIES DIAMOND—Reversible
National Wire Die Co., Inc., New York, N. Y.

DIES—Extrusion
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Kelloy Corporation, New York, N. Y.
Metal Carbides Corporation, Youngstown, Ohio
Metallurgical Products Dept. of General Electric Co., Detroit
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Universal Wire Die Co., Hillside, N. J.
Wayne Wire Die Co., Hillside, N. J.
Wire Tool Div., Bridgeport Jig Boring Co., Bridgeport, Conn.

DIES—Eyelet
Eastern Carbide Corp., New Rochelle, N. Y.
Kelloy Corporation, New York, N. Y.

DIES—Nail, Nail Cutters, Feeder Blocks, Grippers, etc.
Firth Sterling, Inc., Pittsburgh, Pa.
Pittsburgh Carbide Die Co., Monongahela, Pa.

DIES—Pointing
Sjogren Tool and Machine Co., Auburn, Mass.

DIES—Polishing, Asbestos Wire
Beard Machine Co., York, Pa.

DIES—Repairs & Re-Cutting
Ajax Industrial Supplies, Inc., Fort Wayne, Ind.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc., New York, N. Y.
Brenon, Inc., Nixon, N. J.
Eastern Carbide Corp., New Rochelle, N. Y.
Ft. Wayne Wire Die, Inc., Fort Wayne, Ind.
Hoosier Wire Die, Inc., Ft. Wayne, Ind.

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

Indiana Wire Die Co., Ft. Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corporation, Youngstown, Ohio
Metallurgical Products Dept. of General Electric Co., Detroit
National Wire Die Co., Inc., New York, N. Y.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Universal Wire Die Co., Hillside, N. J.
Wayne Wire Die Co., Hillside, N. J.

DIES—Special Shapes, Etc.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelloy Corporation, New York, N. Y.

DIES—Swaging
Sjogren Tool and Mach. Co., Inc., Auburn, Mass.

DIES—Tube Drawing
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Hoosier Wire Die., Inc., Ft. Wayne, Ind.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelloy Corporation, New York, N. Y.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstown, O.
Metallurgical Products Dept. of General Electric Co., Detroit
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.

DRAW BENCHES—
(See MACHINERY—Draw Benches)

DRIVES—Electric, Adjustable Speed
Allis, The Louis Co., Milwaukee, Wisc.

DRUMS—Wire Packaging
Continental Can Company, Van Wert, Ohio
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.

DRUMS & TRAVERSES—For Cable Reels
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio

DRYING EQUIPMENT—
Carl Mayer Corp., The, Cleveland, Ohio
Michigan Oven Company, Detroit, Mich.

EYELETS—Brass or Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FOAM PRODUCING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Parkin Chemical Co., The, Pittsburgh, Pa.

FREQUENCY CHANGERS—
The Louis Allis Company, Milwaukee, Wisc.

FURNACES—Brazing
Ajax Electric Company, Philadelphia, Pa.
Electric Furnace Co., Salem, Ohio

FURNACES—Galvanizing Equipment
Electric Furnace Co., Salem, Ohio
Wilson, Lee, Engr. Co., Cleveland, Ohio

FURNACES—Heat Treating
Ajax Electric Company, Philadelphia, Pa.
Carl Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Wilson, Lee, Engr. Co., Cleveland, Ohio

FURNACES—Pot (Oil, Gas, Electric)
Ajax Electric Company, Philadelphia, Pa.

FURNACES—Resistance Heating, Strand
Electric Furnace Company, Salem, Ohio

FURNACES—Salt Bath
Ajax Electric Company, Philadelphia, Pa.
Electric Furnace Co., Salem, Ohio

FURNACES—Strand Annealing
Ajax Electric Company, Philadelphia, Pa.
Electric Furnace Company, Salem, Ohio

GAUGES—Wire Diameter, Continuous
Industrial Gauges Corporation, West Englewood, N. J.

GALVANIZING EQUIPMENT—(See MACHINERY—Galvanizing Wire)

GEARMOTORS—
The Louis Allis Company, Milwaukee, Wisc.

GRINDERS—Roll
Norton Co., The, Worcester, Mass.

GUIDES—For Wire
Burlington Fabricators Inc., Products Div., Wilmington, Delaware
Heany Industrial Ceramic Corp., New Haven, Conn.

GUIDE TIPS—For Extruding Machines (See NOZZLES)

HAMMERS—Nail Heading
Firth Sterling, Inc., Pittsburgh, Pa.
Pittsburgh Carbide Die Co., Monongahela, Pa.

HAMMERS—Swaging
Sjogren Tool and Machine Co., Auburn, Mass.

HOISTS—Electric Travelling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio

INHIBITORS—Pickling
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Parkin Chemical Co., The, Pittsburgh, Pa.

INKS—Printing, for Insulated Wire
Entwistle Manufacturing Corporation, Providence, R. I.
Gem Gravure Company, West Hanover, Mass.

INSULATING MATERIALS —
Bakelite Company Div. of Union Carbon & Carbide Corp., New York, N. Y.
Blane Corporation, The, Canton, Mass.
duPont de Nemours Co., (Inc.), E. I., Polychemical Dept., Wilmington, Delaware
General Electric Company, Insulating Materials Section, Schenectady, N. Y.
Monsanto Chemical Company, Plastics Division, Springfield, Mass.
Plymouth Cordage Company, Plymkraft Division, Plymouth, Mass.
Shawinigan Resins Corporation, Springfield, Mass.
U. S. Industrial Chemicals Company, Division of National Distillers & Chemical Corporation, New York, N. Y.
United States Rubber Company, Naugatuck Chemical Division, New York, N. Y.

INSULATING MATERIALS—Paper (For Electric Wire Cable)
Plymouth Cordage Company, Plymkraft Division, Plymouth, Mass.

LACQUERING SYSTEMS—See MACH.—Lacquering Electric Wire

LAME—LAHN—
Montgomery Co., The, Windsor Locks, Conn.

LIME—
Warner Co., The, Philadelphia and Bellefonte, Pa.

LUBRICANTS—For Metal Cutting, Stamping and Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Magnuson Products Corporation, Brooklyn, N.Y.
Miller, R. H., Co., Inc., Homer, N. Y.
Nopco Chemical Company, Harrison, N. J.
Rome Soap Mfg. Co., Rome, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.

LUBRICANTS—Wire Drawing
(See Compounds—Wire Drawing)

LUBRICANTS—Wire Rope
Swift & Co., Chicago, Ill.

MACHINERY—Armoring (Cable, Wire, Hose)
American Insulating Mach'y Co., Phila., Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc., (used), Pawtucket, R. I.

MACHINERY—Barbed Wire
Glader Wm., Machine Works, Chicago, Ill.

MACHINERY—Bobbin Winders
Cedar West Tool Company, Inc., New York, N. Y.

MACHINERY—Bolt, Rivet, Screw, etc.
Behr Machinery & Equipment Corp., Rockford, Ill.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Braiding
New England Butt Co., Providence, R. I., Division of Wanskuck Co.
Wardwell Braiding Machine Co., Central Falls, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Bunching
Cook Manufacturing Co., The, Paterson, N. J.
Edmands Company, The, Cranston, R. I.
Haskell-Dawes Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I., Division of Wanskuck Co.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Bundling, Scrap
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Cable, Electric
American Insulating Mach'y Co., Phila., Pa.
Cook Mfg. Co., The, Paterson, N. J.
Haskell-Dawes Machine Co., Philadelphia, Pa.
Kraft, J.. A., Maschinenfabrik, OLPE/Westf., Germany
New England Butt Co., Providence, R. I., Division of Wanskuck Co.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Capstans (See Capstans and Machinery—Winding Wire)

MACHINERY—Centerless Grinding & Polishing
American Laubscher Corporation, New York, N. Y.

MACHINERY—Chain Making
Nilson, A. H. Machine Co., Shelton, Conn.
Pan American Supply Co., The, New York, N. Y.

MACHINERY—Closing Rope
Kraft, J. A., Maschinenfabrik, OLPE/Westf., Germany
Watson Machine Co., Paterson, N. J.

MACHINERY—Coiling Rod
Vaughn Mach'y Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Cold Heading
Behr Machinery & Equipment Corp., Rockford, Ill.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Copper Wire Drawing
American Insulating Mach'y Co., Phila., Pa.
Cook Mfg. Co., The, Paterson, N. J.
Herborn, Maschinenfabrik, Herborn, Germany
Morgardshammers Mek Verkstads A. B., Morgardshammer, Sweden.
National Mach'y Exch (Used), New York
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Covering Wire (See MACHINERY—Insulating Wire)

MACHINERY—Cutting
Eisler Engineering Company, Newark, N. J.
Lewis Machine Co., The, Cleveland, Ohio
Mettler Machine Tool, Inc., New Haven, Conn.
Pan American Supply Co., The, New York, N. Y.
Patterson Machine, Geo. C., Co., Cleveland, Ohio

MACHINERY—Dead Block (Stationary Coiler)
Morgan Construction Company, Worcester, Mass.
Wells Company, Frank L., Kenosha, Wisc.

MACHINERY—Descaling Rod, Dry
Herborn, Maschinenfabrik, Herborn, Germany

MACHINERY—Die Making
Boulin, Victor J., Inc., New York, N. Y.
Dykrex Corp., Roos Tool & Mfg. Div., Newark, N. J.
Firth Sterling, Inc., Pittsburgh, Pa.
Metallurgical Products Dept. of General Electric Co., Detroit
Wayne Wire Die Co., Hillside, N. J.

MACHINERY—Draw Benches
Morgan Construction Co., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Edging (See MACHINERY — Tandem Rolling and Edging Mills)

MACHINERY—Enameling
American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
Davis Electric Co., Wallingford, Conn.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Michigan Oven Company, Detroit, Mich.

MACHINERY—Extruding
Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Royle, John, & Sons, Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

MACHINERY—Fence
Glader, Wm., Machine Works, Chicago, Ill.

MACHINERY—Flat Wire
Mettler Machine Tool, Inc., New Haven, Conn.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Forming Wire
Nilson, A. H. Machine Co., Shelton, Conn.

MACHINERY—Galvanizing Wire
Vaughn Machinery Co., Cuyahoga Falls, O.
Wilson, Lee, Engr. Co., Cleveland, Ohio

MACHINERY—Gang Winders
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Mfg. Co., Wallingford, Conn.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding
Norton Co., The, Worcester, Mass.

MACHINERY—Hydraulic
Manco Mfg. Co., Bradley, Illinois
Porter, Inc., H. K., Somerville, Mass.

MACHINERY—Insulating Wire
American Insulating Mach'y Co., Phila., Pa.
Beard Machine Co., York, Pa.
Davis Electric Co., Wallingford, Conn.
Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Kraft, J. A., Maschinenfabrik, OLPE/Westf., Germany
Litzler, C. A., Co., Inc., Cleveland, Ohio
Michigan Oven Company, Detroit, Mich.
New England Butt Co., Division Wanskuck Co., Providence, R. I.
Pourtier Pere et Fils, Romainville (Seine), France
Royle, John & Sons, Paterson, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Wardwell Braiding Machine Co., Central Falls, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lacquering Electric Wire
American Insulating Mach'y Co., Philadelphia
Cook Mfg. Co., The, Paterson, N. J.
Michigan Oven Company, Detroit, Mich.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Looms, Wire Weaving
Cedar West Tool Company, Inc., New York, N. Y.

MACHINERY—Material Handling
(See Material Handling Equipment)

MACHINERY—Measuring Wire & Cable
Davis Electric Co., Wallingford, Conn.
Durant Mfg Co., Milwaukee, Wis.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
New England Butt Co., Division Wanskuck Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail and Tack
Glader, Wm., Machine Works, Chicago, Ill.
National Mach'y Exch. (Used), New York, N. Y.

MACHINERY—Packaging Wire
Coulter & McKenzie Machine Co., Bridgeport, Conn.
Godderidge Ste., Houilles (Seine-et-Oise), France

MACHINERY—Plating
Hodge Bros. Machine Shop, Ossining, N. Y.
Universal Industrial Equipment Co., Secaucus, N. J.

MACHINERY—Pointing
Herborn, Maschinenfabrik, Herborn, Germany
Morgan Construction Co., Worcester, Mass.
National Mach'y Exch. (Used), New York,
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Polishing Asbestos Wire
Beard Machine Co., York, Pa.

MACHINERY—Printing on Electric Wire
Entwistle Manufacturing Corporation, Providence, R. I.
Gem Gravure Company, West Hanover, Mass.
Gillies, Duncan M. Co., Inc., Boylston, Mass.

MACHINERY—Re-Spooling
Colbourne Machine Company, Winsted, Conn.
Emory Company, Robert J., Newark, N. J.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
Herborn, Maschinenfabrik, Herborn, Germany
Hodge Bros. Machine Shop, Ossining, N. Y.
Industrial Winding Machinery Co., New York, N. Y.
National Mach'y Exch. (Used), New York N. Y.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y Inc. (used) Pawtucket, R. I.

MACHINERY—Rod Mill
Herborn, Maschinenfabrik, Herborn, Germany
Morgan Construction Co., Worcester, Mass.

MACHINERY—Rolling Mill
Morgan Construction Co., Worcester, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Rubber Insulating
Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Royle, John & Sons, Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Serving
Pourtier Pere et Fils, Romainville (Seine), France
Wardwell Braiding Machine Co., Central Falls, R. I.

MACHINERY—Spark Testing
Davis Electric Co., Wallingford, Conn.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
Peschel Electronics, Inc., New Rochelle, N. Y.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Spring Making
National Mach'y Exch. (Used), New York, N. Y.
Pan American Supply Co., The, New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Wells Company, Frank L., Kenosha, Wisc.

MACHINERY—Staple
Nilson, A. H. Machine Co., Shelton, Conn.
Pan American Supply Co., The, New York, N. Y.

MACHINERY—Straightening & Cutting
Lewis Machine Co., The, Cleveland, Ohio
Mettler Machine Tool Co., New Haven, Conn.
National Mach'y Exch. (Used), New York, N. Y.
Pan American Supply Co., The, New York, N. Y.
Patterson Machine, Geo. C., Co., Cleveland, Ohio
Porter, Inc., H. K., Somerville, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Wells Company, Frank L., Kenosha, Wisc.

MACHINERY—Stranding
Godderidge Ste., Houilles, (Seine-et-Oise), France
Haskell-Dawes Machine Co., Philadelphia, Pa.
Kraft, J. A., Maschinenfabrik, OLPE/Westf., Germany
New England Butt Co., Division Wanskuck Co., Providence, R. I.
Superior Tool & Manufacturing Company, Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Swaging
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Take-Up and Pay-Out
American Insulating Mach'y Co., Phila., Pa.
Colbourne Machine Company, Winsted, Conn.
Davis Electric Co., Wallingford, Conn.
Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
Kraft, J. A., Maschinenfabrik, OLPE/Westf. Germany
Litzler, C. A., Co., Inc., Cleveland, Ohio
Pourtier Pere et Fils, Romainville (Seine) France
Standard Mill Supply Co., Pawtucket, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Taping
American Insulating Mach'y Co., Phila., Pa.
Kraft, J. A., Maschinenfabrik, OLPE/Westf., Germany
New England Butt Co., Division Wanskuck Co., Providence, R. I.
Pourtier Pere et Fils, Romainville (Seine), France
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Testing Magnet Wire Coatings for Pin Holes
Federal Mfg. Co., Wallingford, Conn.
Peschel Electronics, Inc., New Rochelle, N. Y.

MACHINERY—Testing, Physical
Scott Testers, Inc., Providence, R. I.

MACHINERY—Tinning Wire
American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
Godderidge Ste., Houilles (Seine-et-Oise), France
Syncro Machine Co., Perth Amboy, N. J.
Universal Industrial Equipment Co., Secaucus, N. J.

MACHINERY—Tinsel Rolling Mills
American Insulating Mach'y Co., Phila., Pa.

MACHINERY—Trolley Wire
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill, Cold Drawing
Mettler Machine Tool, Inc., New Haven, Conn.

MACHINERY—Twinning
(See Mach.—Bunching)

MACHINERY—Twisters, Wire
Cook Manufacturing Co., The, Paterson, N. J.
Edmands Company, The, Cranston, R. I.
Haskell-Dawes Machine Co., Philadelphia, Pa.

MACHINERY—Used
National Machinery Exchange, New York, N. Y.
Wire & Textile Machy., Inc., Pawtucket, R. I.

MACHINERY—Welded Wire Mesh
Manco Mfg. Co., Bradley, Illinois
National Electric Welding Machines Co., Bay City, Michigan
Schlatter, H. A., Ltd., Zurich, Switzerland

MACHINERY—for Wire Welding
(See WELDERS—Butt and Spot and Machinery —Welding Wire Fabrics)

MACHINERY—Winding Wire
Davis Electric Co., Wallingford, Conn.
Emory Company, Robert J., Newark, N. J.
Federal Manufacturing Company, Wallingford, Conn.
Industrial Winding Machinery Co., New York, N. Y.
Kraft, J. A., Maschinenfabrik, OLPE/Westf., Germany
New England Butt Co., Division Wanskuck Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Drawing
Cook Manufacturing Co., The, Paterson, N. J.
Coulter & McKenzie Machine Co., Bridgeport, Conn.
Federal Mfg. Co., Wallingford, Conn.
Herborn, Maschinenfabrik, Herborn, Germany
Hodge Bros. Machine Shop, Ossining, N. Y.
Morgan Construction Co., Worcester, Mass.
Morgardshammers Mek Verkstads AB, Morgardshammer, Sweden
National Mach'y Exch. (Used), New York, N. Y.
Pan American Supply Co., The, New York, N. Y.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Superior Tool & Manufacturing Company, Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wartenweiler, Emilio, Milan, Italy
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Wire Forming
National Mach'y Exch. (Used), New York, N. Y.
Nilson, A. H. Machine Co., Shelton, Conn.
Pan American Supply Co., The, New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

MACHINERY—Wire Rope
New England Butt Co., Division Wanskuck Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wrapping with Paper
Larmuth (1947) Ltd., Swinton, England

MATERIAL HANDLING EQUIPMENT—
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

MOTORS—Electric, A.C. — D.C.
The Louis Allis Company, Milwaukee, Wisc.

NAIL TOOLING—Tungsten Carbide
Firth Sterling, Inc., Pittsburgh, Pa.
Pittsburgh Carbide Die Co., Monongahela, Pa.

NAILS—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Sheffield Division, Armco Steel Corporation, Kansas City, Mo.
Wickwire Brothers, Inc., Cortland, N. Y.

NIPPERS—Wire Cutting
Robinson, M. W. Co., Rockfall, Conn.

NOZZLES—For Extruding Machines
Wire Tool Div., Bridgeport Jig Boring Co., Bridgeport, Conn.

OVENS—Cable Lacquering and Enameling
American Insulating Mach'y Co., Phila., Pa.
Carl Mayer Corp., The, Cleveland, Ohio
Colbourne Machine Company, Winsted, Conn.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Michigan Oven Company, Detroit, Mich.

OVENS—Rod Bakers
Carl Mayer Corp., The, Cleveland, Ohio

OVENS—Welding Rod Coating
Carl Mayer Corp., The, Cleveland, Ohio
Litzler, C. A., Co., Inc., Cleveland, Ohio

PAILS—Packaging
(See Drums—Wire Packaging)

PAINT BONDING CHEMICALS—
American Chemical Paint Co., Ambler, Pa.

PAINTS—Heat Resisting
American Chemical Paint Co., Ambler, Pa.

PAPER—Creped Wrapping
National Waterproof Papers, Inc., Beverly, N. J.

PAPER—For Coil Wrapping and Corrosion Prevention
National Waterproof Papers, Inc., Beverly, N. J.

PAPER—Insulating
Plymouth Cordage Company, Plymkraft Division, Plymouth, Mass.
Twitchell, Inc., E. W., Philadelphia, Pa.

PATENT—ATTORNEYS—
Rommel, Allwine & Rommel, Washington, D. C.

PAY-OUT SYSTEMS—
(See MACHINERY—Take-Up & Pay-Out)

PHOSPHATE COATING CHEMICALS
(See COMPOUNDS—Phosphate Coating)

PICKLING COMPOUNDS—
See (Inhibitors—Pickling)

PLASTICIZERS—
Monsanto Chemical Company, Plastics Division, St. Louis, Mo.

PLASTICS COMPOUNDING—Custom
Plandex Corporation, Downingtown, Pa.

PLASTICS—for Wire Insulation
Bakelite Company Div. of Union Carbon & Carbide Corporation, New York, N. Y.
duPont de Nemours Co., (Inc.), E. I., Polychemical Dept., Wilmington, Delaware
Monsanto Chemical Company, Plastics Division, Springfield, Mass.
Plandex Corporation, Downingtown, Pa.
Shawinigan Resins Corporation, Springfield, Mass.
U. S. Industrial Chemicals Company, Division of National Distillers & Chemical Corporation, New York, N. Y.
United States Rubber Company, Naugatuck Chemical Division, New York, N. Y.

PRINTING WHEELS—for Electric Wire
Entwistle Manufacturing Corporation, Providence, R. I.
Gillies, Duncan M. Co., Inc. Boylston, Mass.

PULLERS AND GRIPS—For Wire
Morgan Construction Co., Worcester, Mass.
Scudder, E. J. Fdry. & Mach. Co., Trenton, N. J.
Sjogren Tool and Machine Co., Auburn, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

RACKS—Wire Storage
Jarke Manufacturing Co., Chicago, Illinois

REEL AND TENSION STANDS—
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Mill Supply Co., Pawtucket, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Wardwell Braiding Machine Co., Central Falls, R. I.
Watson Machine Co., Paterson, N. J.

REEL CRUTCHES—
Watson Machine Co., Paterson, N. J.

REELS & SPOOLS—Aluminum Alloy
Acrometal Products, Inc., Minneapolis, Minn.
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.
National Vulcanized Fibre Co., Lestershire Spool Div., Wilmington, Del.
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS & SPOOLS—Annealing and Stranding
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio

REELS—Metal Bound
Durkee Mfg. Co., Inc., Pine River, Minn.
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.
McCaskie, Inc., William, Westport, Mass.
National Vulcanized Fibre Co., Lestershire Spool Div., Wilmington, Del.
Strand-Buffalo Corporation, North Tonawanda, N. Y.

REELS—Plywood
Carris Reels, Inc., Rutland, Vt.
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.
McCaskie, Inc., William, Westport, Mass.
Strand-Buffalo Corporation, North Tonawanda, N. Y.

REELS & SPOOLS—Steel (All Types)
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Evans, George, Corp., Moline, Ill.
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.
National Vulcanized Fibre Co., Lestershire Spool Div., Wilmington, Del.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS—Steel, for Rope and Cable
Evans, George, Corp., Moline, Ill.

REELS—Wire Mill
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Boonton Molding Company, Boonton, N. J.
Bridge Mfg. Co., The, Hazardville, Conn.
Carris Reels, Inc., Rutland, Vt.
Durkee Mfg. Co. Inc., Pine River, Minn.
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.
McCaskie, Inc., William, Westport, Mass.
Mettler Machine Tool, Inc., New Haven, Conn.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.
National Vulcanized Fibre Co., Lestershire Spool Div., Wilmington, Del.
Nilson, A. H. Machine Co., Shelton, Conn.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS & SPOOLS—Wood
American Woodworking Co., Chicago, Ill.
Bridge Mfg. Co., The, Hazardville, Conn.
Carris Reels, Inc., Rutland, Vt.
Durkee Mfg. Co. Inc., Pine River, Minn.
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.
McCaskie, Inc., William, Westport, Mass.
Strand-Buffalo Corporation, North Tonawanda, N. Y.

REFRACTORIES—High Temperature
Norton Company, Worcester, Mass.

ROD BAKERS—
(See OVENS—Rod Bakers)

RODS—Stainless Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Pittsburgh Steel Co., Pittsburgh, Pa.

RODS—Wire—Non-Ferrous
Platt Bros. & Co., The, Waterbury, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Seymour Mfg. Co., Phosphor Bronze Div., Seymour, Conn.

RODS—Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Sheffield Division, Armco Steel Corporation, Kansas City, Mo.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

ROPE—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Roebling's, John A. Sons Corp., Trenton, N. J.

RUST PROOF COMPOUNDS—
(See COMPOUNDS—RUST Preventing)

RUST REMOVING COMPOUNDS—
(See COMPOUNDS—RUST Preventing)

SATURATION SYSTEMS—
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y Inc. (used) Pawtucket, R. I.

SHEARS—Wire, Rod, Billet
Manco Mfg. Co., Bradley, Illinois

SOAPS—Industrial and Wire Drawing
(See COMPOUNDS—Wire Drawing)

SPOOLS—Plastic
Boonton Molding Company, Boonton, N. J.
Hubbard Spool Company Div., The American Pulley Co., Garrett, Ind.
National Vulcanized Fibre Co., Lestershire Spool Div., Wilmington, Del.
Standard Mill Supply, Co., Pawtucket, R. I

STAMPINGS—Steel
Acrometal Products, Inc., Minneapolis, Minn.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.

STOCK STORAGE SYSTEMS
Jarke Manufacturing Co., Chicago, Illinois

STRAIGHTENERS—Portable Rod
Manco Mfg. Co., Bradley, Illinois

STRIP—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Roebling's, John A. Sons Corp., Trenton, N. J.
Youngstown Sheet & Tube Co., Youngstown, O.

TABLES—Press Feeding
Jarke Manufacturing Co., Chicago, Illinois

TANKS—Compound
Watson Machine Co., Paterson, N. J.

TESTERS—INSULATION
(See MACHINERY—Spark Testers)

TESTING EQUIPMENT
(See MACHINERY Testing, Physical and Diameter Testing)

TINSEL—Electric Conductor
Montgomery Co., The, Windsor Locks, Conn.

TINSEL WIRE—Resistance, Lame, Decorative Cords Thread—Bare Copper Silver and False Gold Coated, etc.
(See TINSEL—Electric Conductor)

TOOLS—Nail Machine
Pittsburgh Carbide Die Co., Monongahela, Pa.

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

TOOLS—Wire Cutting
Porter, H. K., Inc., Somerville, Mass.

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

TRANSMISSIONS—Variable speed (See Adjustable Speed Drives)

TRAVERSES & DRUMS—For Reels
(See Drums & Traverses)

TRAVERSE MECHANISMS—
Davis Electric Co., Wallingford, Conn.
Emory Company, Robert J., Newark, N. J.
Hodge Bros. Machine Shop, Ossining, N. Y.
New England Butt Co., Providence, R. I., Division of Wanskuck Co.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

VARNISHES & LACQUERS—for Electric Wire
General Electric Company, Insulating Materials Section, Schenectady, N. Y.
Shawinigan Resins Corporation, Springfield, Mass.

VULCANIZING PANS AND EQUIPMENT—
American Insulating Mach'y Co., Phila, Pa.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.

WELDERS—Spot and Butt and Welding Wire Fabrics
Eisler Engineering Corp., Newark, N. J.
Micro Products Co., Chicago, Ill.
National Electric Welding Machines Co., Bay City, Michigan
Schlatter, H. A., Ltd., Zurich, Switzerland

WHEELS—for Printing on Electric Wire
Gem Gravure Company, West Hanover, Mass.

WIRE—Aluminum
Chase Brass & Copper Co., Waterbury, Conn.
Malin & Co., The, Cleveland, Ohio
National Standard Company, Niles, Mich.
Scovill Mfg. Co., Waterbury, Conn.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Ball
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Barbed
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.

WIRE—Brass and Bronze
Chase Brass & Copper Co., Waterbury, Conn.
Porter Company, Inc., H. K., Riverside—Alloy Metal Division, Riverside, N. J.
Scovill Mfg. Co., Waterbury, Conn.
Seymour Mfg. Company, Phosphor Bronze Div., Seymour, Conn.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Cadmium
Stamford Processing Co., Peekskill, N. Y.

WIRE—Cast
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Clad and Plated
Sylvania Electric Products Inc., Warren, Pennsylvania

WIRE—Cold Heading
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Porter Company, Inc., H. K., Riverside—Alloy Metal Division, Riverside, N. J.
Scovill Mfg. Co., Waterbury, Conn.
Sheffield Division, Armco Steel Corporation, Kansas City, Mo.
United Wire & Supply Corporation, Providence, R. I.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Copper
Chase Brass & Copper Co., Waterbury, Conn.
Sylvania Electric Products Inc., Warren, Pennsylvania
United Wire & Supply Corporation, Providence, R. I.

WIRE—For Electrical Conductors
United Wire & Supply Corporation, Providence, R. I.

WIRE—Flat
Montgomery Co., The, Windsor Locks, Conn.
National Standard Company, Niles, Mich.
Porter Company, Inc., H. K., Riverside—Alloy Metal Division, Riverside, N. J.
Sylvania Electric Products Inc., Warren, Pennsylvania
United Wire & Supply Corporation, Providence, R. I.
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Galvanized
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
National Standard Company, Niles, Mich.
Roebling's, John A. Sons Corp., Trenton, N. J.
Sheffield Division, Armco Steel Corporation, Kansas City, Mo.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—High Carbon
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Manufacturers
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
National Lock Washer Company, The, Newark N. J.
National Standard Company, Niles, Mich.
Pittsburgh Steel Co., Pittsburgh, Pa.
Republic Steel Corporation, Pressed Steel Div., Cleveland, Ohio
Roebling's, John A., Sons Corp., Trenton, N. J.
Scovill Mfg. Co., Waterbury, Conn.
Seymour Mfg. Company, Phosphor Bronze Div., Seymour, Conn.
Sheffield Division, Armco Steel Corporation, Kansas City, Mo.
Sylvania Electric Products Inc., Warren, Pennsylvania
United Wire & Supply Corporation, Providence, R. I.
U. S. Steel Corp., N. Y., N. Y.
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Metalizing
Platt Bros. & Co., The, Waterbury, Conn.
Stamford Processing Co., Peekskill, N. Y.

WIRE—Music
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Malin & Co., The, Cleveland, Ohio
National Standard Company, Niles, Mich.
Worcester Wire Works Div., National-Standard Company, Worcester, Mass.

WIRE—Needle
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Nickel Alloy
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.

WIRE—Nickel Silver and Phosphor Bronze
Chase Brass & Copper Co., Waterbury, Conn.
Malin & Co., The, Cleveland, Ohio
Porter Company, Inc., H. K., Riverside—Alloy Metal Division, Riverside, N. J.
Seymour Mfg. Co., Phosphor Bronze Div., Seymour, Conn.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Oil Tempered
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Sheffield Division, Armco Steel Corporation, Kansas City, Mo.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Special Shapes
Continental Steel Corp., Kokomo, Ind.
National Lock Washer Company, The, Newark, N. J.
Porter Company, Inc., H. K., Riverside—Alloy Metal Division, Riverside, N. J.
Sylvania Electric Products Inc., Warren, Pennsylvania
United Wire & Supply Corporation, Providence, R. I.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Spring
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
National Standard Company, Niles, Mich.
Pittsburgh Steel Co., Pittsburgh, Pa.
Porter Company, Inc., H. K., Riverside—Alloy Metal Division, Riverside, N. J.
Roebling's John A., Sons Corp., Trenton, N. J.
Sheffield Division, Armco Steel Corporation, Kansas City, Mo.
United Wire & Supply Corporation, Providence, R. I.
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Stainless Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Firth Sterling, Inc., Pittsburgh, Pa.
National Lock Washer Company, The, Newark, N. J.
National Standard Company, Niles, Mich.
Pittsburgh Steel Co., Pittsburgh, Pa.
Porter Company, Inc., H. K., Riverside—Alloy Metal Division, Riverside, N. J.
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Steel—Also Coppered and Galvanized Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Johnson Steel & Wire Co., Inc., Worcester Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
National Standard Company, Niles, Mich.
Pittsburgh Steel Co., Pittsburgh, Pa.
Porter Company, Inc., H. K., Riverside—Alloy Metal Division, Riverside, N. J.
Roebling's, John A., Sons Corp., Trenton, N. J.
Sheffield Division, Armco Steel Corporation, Kansas City, Mo.
U. S. Steel Export Co., New York, N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Straightening and Cutting
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
United Wire & Supply Corporation, Providence, R. I.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Zinc
Platt Bros. & Co., The, Waterbury, Conn.
Stamford Processing Co., Peekskill, N. Y.

WOOD—for Guide, Rolls, Bushings, Wear Parts, etc.

WRAPPING PAPER—Creped
(See PAPER—Creped Wrapping)

YARN TESTERS—
Scott Testers, Inc., Providence, R. I.

The WATSON MACHINE COMPANY

ESTABLISHED 1845

PATERSON 16, NEW JERSEY, U. S. A.

ELECTRICAL WIRE AND CABLE, WIRE ROPE, CORDAGE
AND MASTICATING MACHINERY MANUFACTURERS

WATSON

SELF-POWERED SHAFTLESS TAKEUPS TYPE "V"

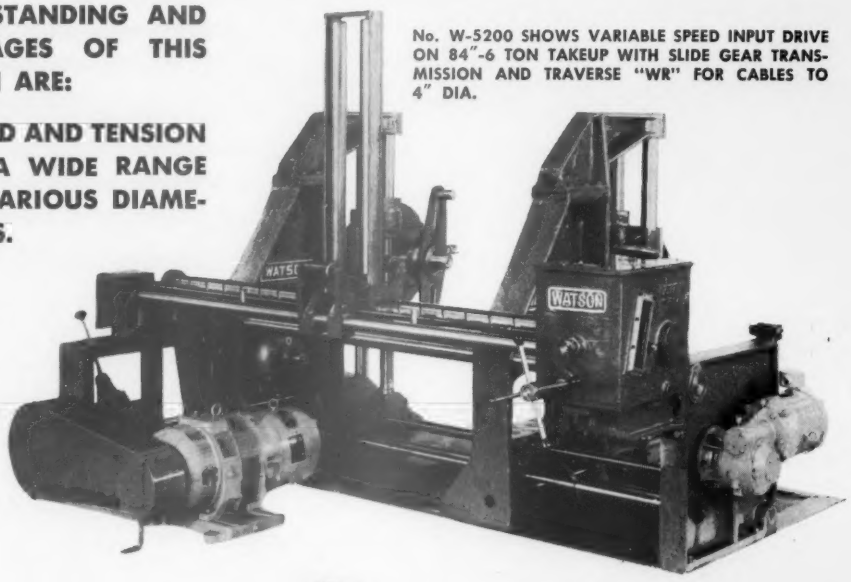
TAKEUPS OF THIS FOREMOST DESIGN, CAPABLE OF THE HEAVIEST DUTY, FURNISHED WITH A VARIABLE SPEED DRIVE MOTOR, MAKE THESE UNITS COMPLETELY INDEPENDENT OF IN-LINE EQUIPMENT AND ESPECIALLY SUITED FOR USE WITH LARGE EXTRUDING, LEAD SHEATHING AND TAPING MACHINES.

SOME OF THE OUTSTANDING AND NOTABLE ADVANTAGES OF THIS "SHAFTLESS" DESIGN ARE:

1—VERSATILITY—SPEED AND TENSION CONTROL OVER A WIDE RANGE WITH REELS OF VARIOUS DIAMETERS AND WIDTHS.

2—SAFETY — ELIMINATION OF ACCIDENTAL INJURY DUE TO HANDLING OF LARGE REEL SHAFTS.

No. W-5200 SHOWS VARIABLE SPEED INPUT DRIVE ON 84"-6 TON TAKEUP WITH SLIDE GEAR TRANSMISSION AND TRAVERSE "WR" FOR CABLES TO 4" DIA.

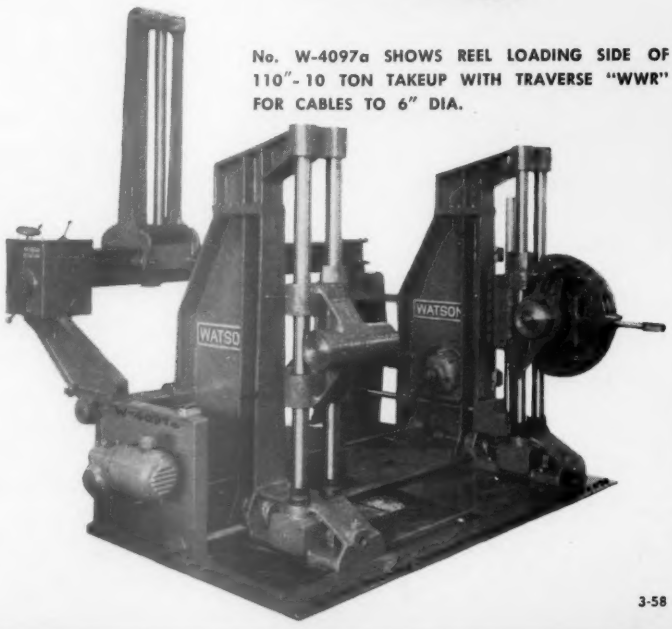


3—FULL MOTORIZATION—DRIVE, REEL LIFT AND FRAME SHIFT ARE ALL MOTOR DRIVEN.

4—EASE — ALL CONTROLS AND ADJUSTMENTS EFFECTED WITH A MINIMUM OF EFFORT.

5—RAPIDITY — LARGEST REELS EASILY AND RAPIDLY ENTERED AND DISCHARGED.

No. W-4097a SHOWS REEL LOADING SIDE OF 110"-10 TON TAKEUP WITH TRAVERSE "WWR" FOR CABLES TO 6" DIA.



AVAILABLE IN 5 SIZES FOR REELS TO 120" DIA.

3-58

LET EF FURNACES take care of your WIRE PROCESSING requirements

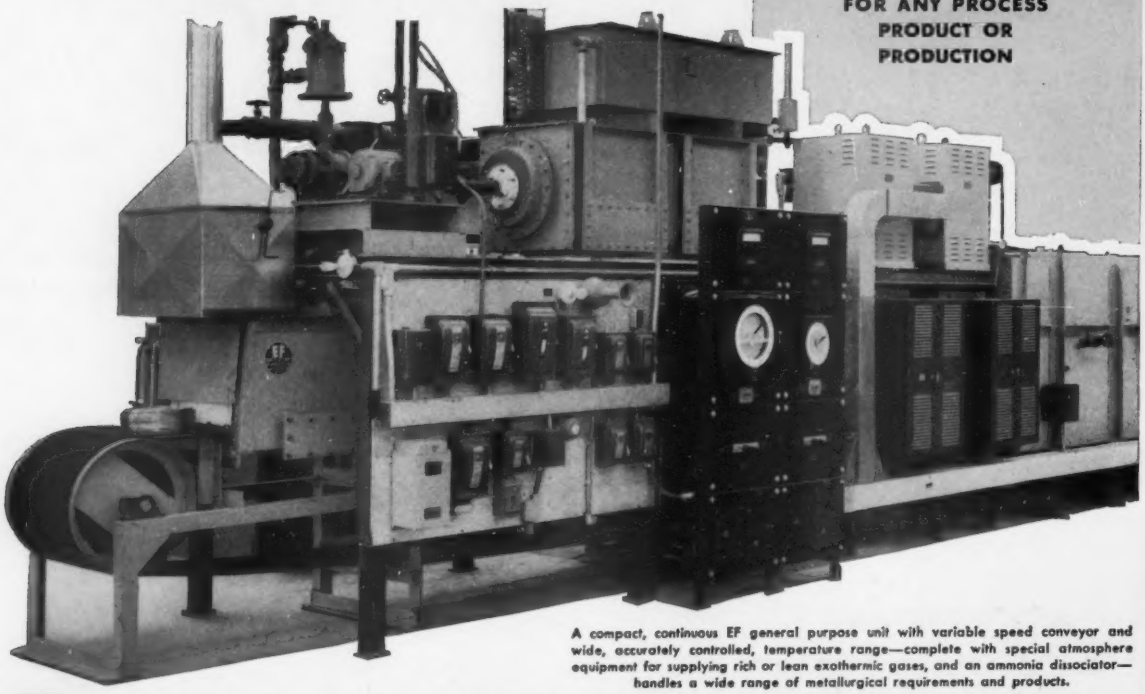
Designed to meet your specific requirements, and incorporating the most advanced heating practices, EF furnaces assure high heating efficiency, accurate automatically controlled cycles, minimum maintenance, continuous trouble-free operation and high hourly outputs. The uniformity of heat treatment reduces the cost of subsequent forming, fabricating and finishing operations, further cutting production costs.

Built in continuous and batch types including roller hearth, roller rail, chain belt, wire belt, slot and tube conveyor, reciprocating, rotary, car, bell, pit and other designs for any ferrous or non-ferrous heating or heat treating process. Furnished complete with special atmosphere producers and any material handling equipment required. For utmost satisfaction — and economy — submit your furnace problems to experienced EF engineers,— *You'll find it pays.*

EF GAS-FIRED OIL-FIRED AND ELECTRIC FURNACES *for*

- AGING
- ANNEALING
- BRAZING
- BILLET HEATING
- CARBON RESTORATION
- CARBURIZING
- CARBONITRIDING
- DRAWING
- GALVANIZING AND ALUMINIZING STRIP
- HARDENING
- HOMOGENIZING
- MALLEABLIZING
- NORMALIZING
- NITRIDING
- SINTERING
- SOLUTION TREATING
- SPECIAL ATMOSPHERE TREATMENTS
- STRESS RELIEVING

A SIZE AND TYPE FOR ANY PROCESS PRODUCT OR PRODUCTION



A compact, continuous EF general purpose unit with variable speed conveyor and wide, accurately controlled, temperature range—complete with special atmosphere equipment for supplying rich or lean exothermic gases, and an ammonia dissociator—handles a wide range of metallurgical requirements and products.

THE ELECTRIC FURNACE CO.

GAS FIRED, OIL FIRED AND ELECTRIC FURNACES FOR ANY PROCESS, PRODUCT OR PRODUCTION

Salem - Ohio

Canadian Associates • CANEFCO, LIMITED • Toronto 1, Canada